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CONDUCTED BY

MR. W. NEWTON,

OF THE OFFICE FOR PATENTS, CHANCERY LANE.

(Assisted by several Scientific Gentlemen.)

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No. CLXXXII.

RECENT PATENTS.

To James Knowles, jun., *of Bolton-le-Moors, coal-merchant, and* Alonzo Buonaparte Woodcock, *of Manchester, engineer, for certain improvements in machinery or apparatus to be employed for raising coal or other matters from mines; which improvements are also applicable to raising or lowering men or animals, or other similar purposes.*—[Sealed 10th October, 1845.]

This invention consists in the application of atmospheric pressure to the raising of weights; and the mode of effecting the same is as follows:—Within a pit or shaft is placed a tube or pipe, constructed of iron, timber, or other suitable material, formed either circular, square, or otherwise, and extending from a few feet above the top or mouth of the mine-shaft to the bottom of the same. This tube, which may be of about five feet diameter, more or less, must be bored or formed accurately to one gauge throughout, and must be so constructed as to be impervious to air when exhausted, and have an air-tight door or doors at or above the level or surface of the ground. In this tube a piston,

working perfectly air-tight, is placed; and to the piston is attached, by rods or otherwise, a cradle or cage for carrying the coal or other matter, or the persons or animals to be raised from the mine. The air is then exhausted above, or compressed below the piston (in the latter case, the lower end of the tube must be closed by an air-tight door), which exhaustion or compression of the air contained in the tube will cause the piston, and with it the cradle containing the load, rapidly to ascend, either to or above the level or surface of the ground, when the piston strikes against and raises a rod, which closes a valve in the pipe connecting the main tube with the air-pump or pumps. By this means the moving power is cut off, and at the same time certain sustaining bolts or catches are shot out to support the cradle or cage. A valve is then opened for the admission of air above the piston, if the air be exhausted, or for the egress or escape of the air below it, if the air be compressed; thus allowing the cradle to fall down upon the catches, which will support it and retain it in this position as long as required: the door or doors of the tube may then be opened, and the load removed. If it is required to lower persons or animals, or empty vessels to the bottom of the shaft, the load is placed in the cradle or cage, and the door or doors closed; the holding catches or bolts are then withdrawn, and air is admitted through the valve of the piston, which will allow the piston, cradle, and load to descend at a velocity regulated by the admission of atmospheric air through the valve above. The advantage to persons in ascending or descending the shaft consists in having at their disposal the power of regulating the speed or velocity of travelling, by means of a valve attached to the piston, by which, in descending, they will allow the atmospheric air to fill the tube above them as they descend; and in ascending, if the velocity be too great, they can reduce it by opening the same valve; thus avoiding the risk of accidents, which so frequently occur from the breaking of ropes; from ascending and descending vessels meeting or coming in contact with the side of the shaft; or from the negligence of the engineer. The speed of ascending and descending may also be regulated in various other ways, as, for instance, by

having a friction-roller fixed to the cradle or the piston, to bear against the side of the tube or pipe in the pit or shaft, and connected by gearing to a common governor, as used in stationary steam-engines, the rod from which is made to open or close a valve attached to the piston according as the balls contract or expand, owing to the decrease or increase in the velocity of the ascent or descent of the piston. Another modification in the arrangement of the apparatus may be made by having two tubes, communicating with each other, by valves, in such a way that when the piston and cradle or cage in one tube is ascending, the piston and cradle in the other tube will descend, and *vice versâ.*

The nature and object of the invention being pointed out, the patentees proceed to describe the manner of carrying the same into practical effect.

In Plate I, fig. 1, is a vertical section, and fig. 2, a horizontal or transverse section of an arrangement of machinery or apparatus to be employed for raising coal or other matters from mines, applicable also to raising or lowering men or animals, or for other similar purposes. *a, a,* is the main tube or pipe, extending from a few feet above the top of the mine-shaft to the bottom of the same, and connected by the pipe *b, b,* to an exhausting pump or pumps, of the required capacity, which may be worked by a steam-engine, or any other suitable motive power. In the tube *a, a,* is fitted a piston *c, c,* (working air-tight) to which the cradle or cage *d, d,* is attached by the rods *e, e.* Upon this cradle *d,* an empty vessel, for containing coal or other matters to be raised from the mine, is placed. *f, f,* are doors for introducing such vessel within the tube. The piston *c,* and cradle or cage *d, d,* are supported by the catches *g, g,* which work through the stuffing-boxes *h, h,* in the side of the tube *a, a.* These catches may be withdrawn, by lifting the handle *i,* which is connected to the catches by the levers *k, k;* the valve *l,* is then opened, and the piston *c,* and cradle *d,* will descend to the bottom of the shaft, at a velocity regulated by the admission of atmospheric air through the valve *l,* above. When arrived at the bottom, the empty vessel may be replaced by a full one, through the opening *n,* and the pump

or pumps set to work to exhaust the air from the tube; thereby causing a vacuum equal to the weight of the piston, cage, and load, inclusive of friction, so that from the pressure of the atmosphere below the piston *c*, the piston, cradle, and load will rapidly ascend the shaft to a height a little beyond where the catches *g*, *g*, are fixed. The ascent of the piston will raise the rod *o*, *o*, which is weighted, so as to rest upon the shoulder *p*, and the tappet *q*, upon the rod, raises the ratchet *r*, from off the catch *s*; thus allowing the weighted lever *i*, to fall down and force in the catches *g*, *g*, and at the same time to close the stop-valve *t*, in the exhausting-pipe *b*, *b*, by means of the rods *u*, *u*, and bell-crank lever *v*, whereby the communication with the exhausting pumps is cut off. Atmospheric air being then admitted through the valve *t*, the piston and cradle or cage will descend upon the catches *g*, *g*, when the door *f*, may be opened, and the full vessel removed. *w*, is a valve, by which a person or persons descending may regulate the velocity of travelling, by allowing the atmospheric air to fill the tube above them.

Fig. 3, is a sectional view, shewing another arrangement of apparatus, by which the speed of ascending or descending may be regulated. *a*, *a*, is the main tube; *b*, *b*, the exhausting tube; and *c*, *c*, are the two piston-plates, connected firmly together by means of the bolt *d*, and supporting the cradle or cage *d**. When the upper part of the tube is exhausted, the ring *e*, of iron or other metal, supported upon the blocks *f*, *f*, at suitable intervals upon the upper plate of the piston, comes in contact with the vertical rod *g*, passing through a slotted bar *h*, and connected to the bell-crank lever *i*; the lower end of this lever *i*, is furnished with a fork, which, when the rod *g*, is raised, takes hold of the grooved head of the bolt *d*, and thus sustains the whole of the apparatus at the same time that the levers *k*, *k*, open the slide-valve *l*, for the admission of atmospheric air. When it is desired to allow the apparatus to descend, the air above the piston *c*, is partially exhausted, which will raise the stud *d*, off the fork on the end of the lever *i*; the weight of the vertical rod *g*, will then throw the bell-crank lever *i*, into the position shewn in the drawing, and at the same time close the slide-valve *l*; the valve in the exhausting pipe is then closed,

and the apparatus begins to descend: or the vertical rod *g*, may be forced inwards, by means of the slotted bar *h*, worked by the handle *m*, outside the tube.

At the commencement of the descent of the apparatus, the balls *n*, *n*, of the governor are collapsed, and the valves *o*, *o*, on the piston-plates are open; but as the velocity of the descent increases, the rotation of the friction-roller *p*, which bears against the side of the tube, will cause the governor-balls *n*, *n*, to expand and close the valves *o*, *o*; thus, by lengthening or shortening the rod *r*, which works the valves, the speed may be regulated to any required velocity. In ascending, the pressure of the atmospheric air below keeps the valves *o*, *o*, closed; but as soon as the slide-valve *l*, in the side of the tube, is opened, the valves *o*, *o*, open by their own gravity.

Fig. 4, is a sectional view, shewing the arrangement of a double-acting apparatus, adapted for those situations where it is required to lower the empty vessel at the same time that the full one is ascending. *a*, *a*, is the exhausting-pipe, in connection with a pair of double-acting air-pumps, or other suitable exhausting power; *b*, is a three-way cock, communicating by the curved pipes with the main pipes or tubes *c*, *c*;—*d*, and *e*, are two cages or cradles, fitting the interior of the pipes *c*, *c*, as pistons; and *f*, is a valve-box at the bottom of the pit or shaft, forming the communication between the two tubes *c*, *c*, through the ball-valves *g*, *g*. Suppose the cage *d*, to be charged with coal or other material at the bottom of the pit or shaft of the mine, while the empty cage *e*, is at the top, the door (not shewn in the drawing) must be closed, and the pumps or other exhausting power set to work. The effect is the exhaustion of the atmospheric air in the tube above the cage *d*, and (by the action of the three-way cock *b*,) a condensation of the same above the cage *e*, whereby the loaded cage is lifted and the empty one lowered. Upon reversing the cock *b*, the cage *d*, will ascend and the cage *e*, descend, and so on alternately.

The patentees claim the application, employment, or use of atmospheric pressure, as exhibited in the drawing, and hereinbefore particularly described, for the several purposes above stated.—[*Inrolled in the Petty Bag Office, April,* 1846.]

Specification drawn by Messrs. Newton and Son.

To William Garnett Taylor, *of Halliwell, in the county of Lancaster, cotton spinner, and* William Taylor, *of Halliwell aforesaid, labourer, for improvements in consuming smoke and economising fuel.*—[Sealed 3rd February, 1846.]

This invention of improvements in consuming smoke and economising fuel, may be applied to all furnaces constructed in the ordinary manner with open ash-pits, and whether employed in connection with steam-engine or other boilers, or used in any other situation where the consumption of smoke and consequent economy of fuel is desirable, and where steam or other power can be obtained, for moving the exhausting and blowing apparatus hereinafter described. This invention is intended to effect a more perfect combustion of the inflammable gases and unconsumed particles of carbon, which, in the ordinary construction of furnaces, pass up the chimney as smoke, and consists—firstly, in the application to the furnaces of an exhausting and blowing apparatus; and, secondly, in a peculiar distribution or arrangement of the smoke flues, so as to be adapted to the operation of such apparatus. A fan or blower is applied to the smoke-flue, to arrest the smoke and other gaseous products evolved from the furnace, during their passage from the furnace to the chimney, and bring them back through another flue, leading from the fan or exhausting and blowing apparatus, and opening on to the "dead plate," or thereabouts, at or near the front of the fire-bars or furnace. The smoke is, by the action of the fan, passed over the fire, where the sooty exhalation is consumed, and prevented passing up the chimney into the atmosphere.

In Plate III., the invention is represented as applied to the furnaces of two common steam-engine boilers. Fig. 1, is a longitudinal section taken vertically through one of the boilers and furnaces; fig. 2, is a sectional plan or horizontal view of the furnaces and flues (the boilers being removed); and fig. 3, is a transverse section of the same. *a, a,* is the foundation brick-work, supporting the boilers *b, b*; *c, c,* are the "dead plates" of the furnaces; and *d, d,* the fire bars.

e, and *e**, are two bridges; the first *e*, about six inches, and and the second *e**, about four inches from the bottom of the boiler (although these are not absolutely necessary, yet the patentees prefer two bridges). *f*, *f*, are the ordinary flues, joining ultimately in the flue *g*, which leads to the chimney; *h*, is a fan, enclosed in a box *i*, and being caused to revolve by a band or strap passing around the pulley *k*, or by any other convenient means, at a high velocity, say seven hundred revolutions per minute, it will have the effect of arresting the smoke and other vapours and gases in their progress to the chimney, and after drawing them through the flues *l*, *l*, to the centre of the fan, drive them along the flue *m*, to the vertical flue *n*. This flue *n*, has at its lower end two thoroughfares *p*, *p*, one leading on to or near the "dead plate" of each furnace. Thus it will be seen, that the smoke and other gaseous vapours, instead of passing off directly to the chimney, are arrested and brought back by the action of the fan *h*, and by it kept in a state of constant circulation over the fires until consumed. It is desirable that the engineer should keep the thoroughfares *p*, *p*, clear with a rake; and also, upon introducing fresh fuel into the furnace, he should expose the live coal as much as possible, in order to facilitate the combustion of the smoke and gaseous vapours.

The patentees remark that they are aware the idea of withdrawing the gases from the flues of furnaces, &c., by mechanical means, for the purpose of mixing them with atmospheric air, and of causing the mixture to be returned again through the furnace, is not new, this having been previously contemplated. They therefore wish it to be understood, that they do not claim the withdrawing of gases from the flues of furnaces, or returning them, mixed with atmospheric air, to the furnaces, nor do they claim the exclusive use of the mechanical apparatus and arrangements above described, except when the same are used for the purposes of their invention; but they do claim the improvements in consuming smoke and economising fuel, resulting from arresting the smoke in the flue prior to its ascending the chimney, by means of a revolving fan or blower, or other convenient apparatus, and returning the smoke so arrested, by means of a suitable flue,

on to the "dead plate," or thereabouts, at or near the front of the fire-bars or furnace, to be re-passed over the fire, as above particularly set forth and described, without the introduction or admixture of fresh atmospheric air, otherwise than by the common open ash-pit, in the usual manner.—[*Inrolled in the Petty Bag Office, August,* 1846.]

To WILLIAM NEWTON, *of the Office for Patents,* 66, *Chancery Lane, in the county of Middlesex, civil engineer, for an invention of improvements in manufacturing types and other similar raised surfaces for printing,—being a communication.*—[Sealed 17th November, 1845.]

THESE improvements in manufacturing types and other similar raised surfaces for printing, consist in a novel arrangement of machinery, by which matrices and moulds, of the like kind to those commonly used in casting types, may be worked through the agency of mechanism, instead of the ordinary mode of casting types by the hands of a workman. In this novel arrangement of machinery, a pan or vessel, containing molten type-metal, is placed over a furnace contiguous to which the mould with the matrix is mounted with certain appendages; whereby the melted metal is forced into the mould, for the purpose of casting a type; and when such type has been cast, the mould is thrown open for the discharge of the type, and closed again ready for a second operation.

In Plate II., fig. 1, is a front elevation of the machine, complete and in working condition; fig. 2, is a side elevation of the same, taken at the left-hand of fig. 1. A horizontal view of the machine as it would appear from above, is represented at fig. 3; the mould and its frame and appendages being in this figure removed, to shew the parts below more clearly. A vertical section of the machine, taken through the middle of the mould, the furnace, and the pot of melted type-metal, is shewn at fig. 4; this section being taken in the dotted lines Z, Z, of figs. 2, and 3;—and a similar section of the machine, taken in the dotted lines Y, Y, of figs. 2, and 3, is represented at fig. 5.

The construction of matrices and moulds used for casting the types in this machine are not intended to be in any respect different from the ordinary type matrices and moulds heretofore used by hand, excepting that, in this instance, the mould opens and closes upon a hinge joint, which opening and closing of the mould is effected by the movements of the machine, obtained from a rotary axle, having cams that act upon rods and levers. The matrix and mould are attached to a lever frame A, A, which lies in an inclined position at the upper part of the machine, along the right-hand side of fig. 1. The upper side of this lever frame carrying the mould is represented in the detached fig. 6; the mould being thrown open to shew it more clearly. The open position of the mould is also seen in the section of the machine at fig. 4. *a, a,* is that portion or half of the mould which is affixed to the end of the lever frame A; *b, b,* is the other portion or half of the mould, attached to the jointed piece B, turning upon the centre *c*. These parts *a,* and *b,* when brought together, as shewn by dots in fig. 6, form an aperture *d,* between them, in which the body of the type is to be cast; the matrix in which the figure of the type has been cut or stamped, lying over the aperture in the ordinary way, as shewn by dots at *e*. A longitudinal section of this lever-frame, with the mould and matrix taken nearly in a perpendicular direction, is represented at fig. 7. Melted type-metal, contained in a pan or vessel C, (seen best in the section fig. 4,) is kept in a proper state of fluidity by the fire in the furnace D, below. From this pan C, the fluid type-metal is allowed to pass into a receptacle E, within the pan, by means hereafter described; and a plunger *f,* being brought down suddenly in the receptacle E, causes a jet of the melted type-metal to be forced up the channel *g,* into the aperture *d,* of the mould, by which a type is cast.

The details of the apparatus, and the mode of its operating, are as follows:—The machinery is mounted in a frame having standards and platforms, upon which a close furnace D, is erected, with the melted-metal pan C, above. The lever-frame A, carrying the type-mould, is mounted upon adjustable centres *h, h,* in the upper part of a stationary inclined standard

F, fixed to the platform. The actuating power by which the machine is to be worked is applied to the rotary shaft G, G, by a winch or handle H, in front; and its equal rotary motion is governed by a fly-wheel I, at the reverse end of the shaft. Upon the shaft G, there are two cams *i*, and *k*, which are the agents for supplying the melted metal to the mould; another cam or excentric *l*, on the same shaft, is the agent for depressing the lever-frame A, which brings the aperture of the mould into contact with the orifice *g*, of the receptacle E, from whence the melted metal is injected into the mould; this excentric also, as it revolves, causes the lever-frame to be raised after the type has been cast, and to open the mould, by which the type is discharged. The melted metal in the pan C, flows through a small aperture into the receptacle E, (see fig. 4,) which aperture must be closed before the melted metal can be injected into the mould by the plunger *f*. This first operation of the machine is effected by the larger radius of the revolving cam *i*, coming against the under part of a lever *m*, (see figs. 2, and 5,) when, by the lifting of that lever, the vertical rod *n*, will be raised, the upper part of which rod is attached to a spring lever *o*, working on a fulcrum pin *p*. The shorter arm of this lever *o*, passes through a slot in the upper part of the rod *q*, which rod works a sliding valve that covers the communicating passage between the melted metal pan C, and the receptacle E. Hence, by the larger radius of the cam *i*, coming into operation, as described, the communication between the pan C, and the receptacle E, is closed, and the metal is prevented from flowing back into the pan. Immediately after this passage has been closed, a deep notch in the smaller radius of the cam *k*, coming round under the lever *r*, (see figs. 2, and 5,) allows that lever to be suddenly drawn down by the force of a weighted rod *s*. To this lever *r*, a vertical rod *t*, is attached; the upper end of which rod is connected by a joint to about the middle of a horizontal lever K, hanging upon a fulcrum-pin in the top of a standard L; and to the reverse end of this lever K, is fixed the plunger *f*, before mentioned. It will therefore be seen, that on the falling of the lever *r*, into the notch of the cam *k*, the lever K, will descend, and cause the plunger *f*, to force a

quantity of the melted metal from the receptacle E, through the passage *g*, into the mould and matrix, by which a cast metal type is produced. The further rotation of the shaft G, will now raise the before-mentioned lever K, which will lift the plunger *f*, from its depressed position, and at the same time the communication will be opened for a further supply of the melted metal to flow from the pan C, into the receptacle E, ready for the next casting. The periphery of the revolving excentric *l*, upon the shaft G, is embraced by a clasped hoop *u*, *u*, to which is affixed a bracket-arm *v*, forming a socket and guide for the rod M; by the sliding of which rod the lever-frame A, is raised and depressed, for the purpose of bringing the mould down into contact with the jet of melted type-metal *g*, (as shewn at fig. 4,) and raising it after the operation of casting, in order to discharge the type. The upper end of the rod M, is connected by a joint to the under part of the lever-frame, as seen in figs. 2, 5, and 7; and it will be perceived by reference to fig. 5, that as the excentric *l*, goes round, the bracket-arm *v*, will be made to slide up and down the rod M, when, by the bracket-arm *v*, coming into contact with the stud or shoulder *w*, fixed on the rod M, that rod will be pushed up, and thereby made to raise the lever-frame, which works upon the back centres *h*, *h*. The mould having by this movement been opened, and the cast type discharged therefrom, the lever-frame is drawn down again, the mould closed, and brought into connection with the jet *g*, by the descent of the sliding-rod M, as before stated, ready to receive the melted type-metal for a fresh casting. This descent of the sliding-rod M, is facilitated by the two rods *x*, *x*, attached to the ears of the hoop *u*, *u*, embracing the excentric *l*; the upper ends of the rods *x*, *x*, have a cap-piece N, connecting them together, which presses upon the end of the strong helical spring coiled round the rod M, and thereby brings down the rod, and with it the lever-frame A, as before said. The mould thus brought into contact with the jet of the metal pan is held there during the operation of casting; but it may be desirable to afford at this time a certain degree of elastic pressure to the mould which comes against the jet, in order to prevent any strain that might

arise from a portion of hard type-metal accidentally intervening: this is effected by the pressure being communicated through the helical spring.

The mode of opening and closing the mould, as the lever-frame A, rises and falls, is thus described:—On the upper surface of the lever-frame (as seen in figs. 6, and 7,) there are several small levers and sliders, for tilting the matrix after the mould has been thrown open; but the means of opening the mould will be best seen in fig. 8, which represents an edge view of the lever-frame and its appendages, as they would appear if viewed on the right-hand side of fig. 1. The inclined standard F, supports the bracket and centres on which the lever-frame A, works; and the manner in which this lever-frame is made to rise and fall, having been explained, it will be necessary to shew how this rising and falling motion is made available for opening and closing the mould. A small standard P, fixed on the top of the inclined standard F, has a jointed tension-rod Q, attached to it; the reverse end of which rod Q, is, by a joint, connected to the bracket-frame B, that carries the moveable part of the mould *b*. When the lever-frame A, is raised, by the means before described, the tension-rod Q, forces the mould to open, by its bracket-frame B, turning upon the centres *c*, *c*; and when the lever-frame is brought down, the mould is closed by the same means. The type having been cast by the operations described, the opening of the mould causes a small hook *y*, to take hold of the type and pick it out of the half of the mould to which it is attached. But previous to this opening of the mould, the die or matrix *e*, must be tilted, in order to withdraw it from the face of the type. This is done by means of a tilting-lever R, mounted on the upper surface of the lever-frame, which tilting-lever is acted upon by a sliding-wedge S, connected to a small lever T, jointed to a standard U. These parts are best seen in the detached figs. 6, and 7; and on referring thereto it will be perceived that as the lever-frame A, rises, the sliding-wedge S, will be pushed under the tail of the tilting-lever R, by which the small beak *z*, will be made to press upon the end of the matrix, and tilt it. On the descent of the lever-frame, the sliding-wedge will retire,

and the large spring v, attached in the ordinary way to the mould and matrix, will cause the matrix to assume its operating position.

It has been found desirable, in some cases, to adopt a method of keeping the mould cool while the operation is going on. This may be very conveniently done by forming the lever-frame hollow, and causing a current of cold water to pass through it continually. It may be remarked, that it is desirable the workman who attends the machine to turn the winch-handle, should keep in his hand a small brush, to wipe off any small particles of metal which may attach themselves to the face of the feeding-nipple.

The patentee claims the novel construction or arrangement and use of the machinery, herein described, for casting types and other like printing surfaces.—[*Inrolled in the Petty Bag Office, May,* 1846.]

Specification drawn by Messrs. Newton and Son.

To ALFRED VINCENT NEWTON, *of the Office for Patents,* 66, *Chancery-lane, in the county of Middlesex, mechanical draughtsman, for an invention of certain improvements to be applied to the grinding of grain and other substances, —being a communication.*—[Sealed 11th February, 1846.]

THIS invention of improvements to be applied to the grinding of grain and other substances, as communicated to the patentee, refers, in the first place, to a method of drawing out the pulverized material from between the grinding surfaces of mills, immediately the pulverization is effected; by which means the grinding surfaces are kept comparatively free, and thus a greater quantity may be ground in a given time, than by the ordinary arrangement of grinding mills.

The second part of the invention consists in the introduction of heated air between the grinding surfaces of mills, when substances containing moisture are required to be pulverized.

In Plate I., fig. 1, represents, in sectional elevation, a pair of stones, capable of being worked according to this invention. A, is the fixed or bed-stone, and B, the top-stone

or runner; C, is an air-tight case, enclosing the stones, so as to cut them off from any connection with the external air, excepting that which enters the eye in the middle of the runner, along with the grain or other matter to be operated upon; D, represents one of two air-pumps, placed near to each other on one side of the casing C, which has openings in it to allow of a communication being established between each of the air-pumps and the interior of that case, by means of a shute E. These shutes are intended to conduct the flour, as it passes out from the grinding surfaces, to a suitable receiver, from whence it may be taken up and bagged at the convenience of the miller. *a*, is a flexible tube of leather or other suitable material attached to the case C, and suspended directly over the eye of the runner B. This tube is intended to prevent the air, which enters with the grain, from passing over the top of the runner and entering between the grinding surfaces at their circumference; and, in order the more effectually to prevent this, a thin metal tube *b*, is attached to the top-stone B, and descending into the eye or feed-hole to the depth of the tube *a*, has a return, or lip, to embrace the lower edge of the tube *a*, but yet allows sufficient space to prevent any injury to that tube when the top-stone is rotating. *c, c*, are pieces of wood, or other substance, fixed at any required distance apart on the periphery of the runner B, and are intended to carry the flour or other product (as it exudes from the grinding surfaces) forward into the shutes E, which are provided with two valves *d*, and *e*, opening outwards, for the purpose to be now explained:—Suppose rotary motion to be communicated to the top-stone or runner, by the ordinary arrangement of gearing, and the seed or other substance to be supplied to the stones through the tube *a*, the pistons of the pumps D, are worked, to produce a vacuum or partial vacuum between the grinding surfaces. The effect of this action, as long as it is continued, will be a rush of air down the eye of the top runner; which rush of air will force out the flour from between the grinding surfaces immediately it is formed; and on the ascent of the piston (which, as it rises, opens the valve *d*,) will blow the flour into the shute E. On the descent of the piston, the valve *e*, will be forced open,

and thus allow the flour to descend and enter the receiver. The advantages of this arrangement will be readily seen by the practical miller; for, immediately the grain is reduced to flour, the fine particles will be driven out from between the grinding surfaces in a dry state, and thus the liability of the stones clogging, and consequently becoming heated, will be in a great measure avoided. A further advantage consequent upon the flour being, immediately it is formed, disengaged from the grinding surfaces is, that as they are comparatively clear, they are ready to receive a fresh supply of grain, which, in like manner, is blown off directly the fine particles are produced, instead of being carried round unnecessarily over the face of the bed-stone until pushed out by the fresh supply, as is the case according to the present mode of grinding.

Fig. 2. represents, in plan view, an arrangement of two pairs of grain-mills, provided with rotary fans instead of air-pumps, as before described, which fans are intended to conduct the pulverized material into the receiver, and cause a rush of air down the eye of the runners, by producing a vacuum or partial vacuum in the cases enclosing the grain-mills—the mill on the left in the drawing, and the fans, as well as the receptacle for the flour, are shewn in section. Fig. 3, is a sectional elevation of the two pairs of stones, taken in the line 1, 2, of fig. 2. A, A, A, are the mill-stones, mounted in the ordinary manner; B, B, B, the curb and casing to the same; C, the eye or hole through the middle of the top stones or runners; D, D, are the blowers or fans; E, is a chamber, to receive the flour or other pulverized matter as it passes from between the grinding surfaces; F, is a pipe or shaft for the escape of the air, and G, is an opening in the side of the receiver E, to allow of the product being carried off in any convenient way; H, H, are the blower or fan-boxes in communication with the receiver E;—I, is a slide, which covers an opening made in the receiver for the purpose of getting to the interior; the bottom K, of the receiver is so constructed as to be capable of revolving when the machinery is in operation. *f*, is a slide in the mill-curb, or casing, and *g*, is a smaller slide at the bottom of the same, to enable the attendant to examine the product; the large opening *f*, at the

top of the curb, is to permit a free inlet of air, when *g*, is opened, or otherwise the product will flow by with two great rapidity. These two ports should be opened simultaneously, and closed again as soon as possible. *h*, is a flat piece of wood or other substance, supported in guides, and resting on the revolving-plate K, which receives the product as it passes from the stones, and carries it to the outlet at G. These guides are secured at one end to the side of the receiver E, and at their other end to a tube L, placed in the centre of the receiver, round which the plate K, rotates.

It will be obvious that, for the more perfect carrying out of this invention, the air should only be permitted to enter at the eye or feed-hole of the stone; hence, as there is always a tendency to a state of vacuum within the mill, every part should be as air-tight as possible. For this purpose, the joints between the blowers and the curb, as well as the bottom of the curb, should have stout canvas or other flexible material glued thereon; which, in dismounting and setting up the mill, may be readily raised and re-adjusted. For the same reasons, the joints at *a*, *f*, and *g*, should be as close as possible.

The corn, seed, or other matter to be ground, is conducted into the mill by a vertical tube *k*, which has an adjustable end dipping into a small cup *l*, fixed in the eye of the runner; and as the supply of corn or other matter under operation is required to be increased or diminished, the adjustable end is proportionably raised or lowered. When the mill is ready for working, rotary motion is communicated to the top stones and also to the fans, which may be provided with independent pulleys, so that one or both may be worked as required, where more than one set of stones are employed.

A similar effect to that above described, with reference to fig. 1, will now be produced, viz., the pulverized matters (immediately they are produced) will be forced out from between the grinding surfaces, by the rush of air down the eye of the top stones, caused by the rapid rotation of the exhausting fans, and passing with the current of air through the case H, will enter the receiver E. The air will then pass off by the pipe F, carrying with it the disengaged moisture and heat,

and the flour or other pulverized substance will fall on to the plate K, which forms the bottom of the receiver. This plate being made to rotate, as before mentioned, will carry the flour round to the board *h*, where, meeting with a stoppage to its further progress, the flour is forced out at the opening G, as it accumulates at that spot; but if the accumulation is too great, the flour, by pressing against the board *h*, (which is bevilled at its lower edge on the side in contact with the flour) will raise the board in its guides, and passing under it will prevent the straining of the machinery. The capacity of the pumps in the plan, fig. 1, and of the fans in figs. 2, and 3, must be regulated according to the capacity of the mill, or number of stones, or extent of grinding surface employed.

In grinding dye woods and other substances containing moisture, the second part of this invention, viz., the introduction of heated air between the grinding surfaces of mills, is proposed to be employed. This improvement is effected by making a communication between a suitably-heated chamber (or air-pipes in the flues of an adjacent furnace) and the eye of the top stones or runners, by which means the atmosphere is excluded, and the heated air in the pipe of communication is drawn between the grinding surfaces, by the action of the fans before mentioned. The pair of stones on the left-hand side of fig. 3, is represented as furnished with a pipe *m*, for conducting the heated air to the mill. By referring to this figure it will be seen, that the connection with the eye of the runner is air-tight, in order to supply the matter to be operated upon to the grinding surfaces. The end of the supply-pipe *k*, is made to enter the pipe *m*, at that part which is directly above the eye of the runner. The case enclosing the stones may, when the heated air is employed, be made, with advantage, of sheet-iron.

In conclusion, the patentee remarks, that he is aware several plans have been suggested for causing a circulation of air between the grinding surfaces of mills, in order to prevent them from heating and spoiling the flour, and that such introduction of air has been effected by cutting away portions of the grinding surfaces, thus deteriorating the grinding capacity of the stones, by diminishing the grinding surface,

and permitting accumulations of flour or other pulverized matter in the cavities so made; and also that air has been forced upwards through the bed-stone and distributed by fans within the mill; but by this plan the greater portion of the air so forced in escapes through the eye of the runner, and carries with it more or less of the pulverized material. The patentee, therefore, lays no general claim to the introduction of atmospheric air to the grinding surfaces of millstones; but he claims, Firstly,—producing a continuous current of air down the eye of the runner, and between the grinding surfaces of mills, so as to escape at a given outlet, and carry with it the flour or other pulverized matter, as soon as the fine particles are obtained, in order that the grinding surfaces may be prevented from choking, and a greater quantity of work may be performed with the same machinery; and, Secondly,—the introduction of heated air to the grinding surfaces of mills, for the more efficient grinding and pulverizing of substances containing moisture, or of substances which, after grinding, according to the ordinary mode, require to be dried by artificial means.—[*Inrolled in the Petty Bag Office, August,* 1846.]

Specification drawn by Messrs. Newton and Son.

To RICHARD MARVIN, *of Portsea, in the county of Southampton, Gent., and* WILLIAM HENRY MOORE, *of Southsea, in the same county, Gent., for improvements in gratings of metal or wood, for the fronts of houses and general purposes, for the admission of light and ventilation.*—[Sealed 28th May, 1846.]

THIS invention consists in constructing gratings, as shewn at figs. 1, and 2, in Plate II.; fig. 1, representing part of a grating in plan view, and fig. 2, exhibiting a vertical section of the same. The bars of the grating are composed of wrought or cast metal, or wood; and they are fixed in the frame in such a manner that the top of one bar shall cover the bottom of the next bar. The length of the frame is regulated by the number of bars to be fixed therein; it is two

inches deep, and five-eighths of an inch thick. The length of the bars depends upon the size of the required grating; the depth of each bar is three inches on the top or front side, and three inches and a-half on the under side; the thickness is three-quarters of an inch on the top or horizontal surface, gradually reduced to three-eighths of an inch in the middle, immediately beneath which it is reduced to three-sixteenths of an inch, and then gradually reduced to one-eighth of an inch at the bottom. The distance from one bar to another is one inch and a quarter at the top, which is increased to one inch and seven-eighths at the bottom.—[*Inrolled in the Inrolment Office, November,* 1846.]

To NATHAN DEFRIES, *of St. Martin's-lane, engineer, for improvements in gas-meters.*—[Sealed 27th May, 1846.]

THIS invention consists in certain methods of constructing and applying rotatory valves to dry gas-meters; the object being to prevent the gas from entering the compartment wherein the registering apparatus or works are contained.

In Plate I., fig. 1, is a horizontal section of a dry gas-meter, taken on a level with the upper surface of the valve-seat; and fig. 2, is a vertical section, taken on the line 1, 2, of fig. 1, the upper portion, containing the works, being removed. The lower part of the meter is divided into three compartments by the partitions *a, b, c,* and these are subdivided into six measuring-chambers by flexible diaphragms *d, e, f,* which are connected, in the usual manner, with the registering apparatus. The gas passes from the supply-pipe along the pipe or passage *g,* and through the opening g^1, (indicated by the dotted circle) into the central compartment *h,* from which it is admitted into the several measuring-chambers through the passages *j, k,* by the rotatory valve *i*; and after acting on the flexible diaphragms it is admitted, by the valve *i,* into the passage *l,* connected with the pipe leading to the burners;—the rotary valve *i,* receives motion from the works in the upper part of the meter. The construction of the valve and valve-seat will be understood on referring to figs.

3, 4, and 5; fig. 3, representing a vertical section of the valve, fig. 4, a plan view of the under side thereof, and fig. 5, a plan view of the valve-seat.

Fig. 6, is a vertical section of part of a gas-meter, in which the construction of valve employed is different from that above described; and figs. 7, 8, and 9, are detached views of the valve and valve-seat. In this case, the gas, after acting on the diaphragms, is discharged by a valve into the compartment *m*, formed by the box or cover *n*, (which separates the valve from the chamber containing the registering apparatus), from whence it passes away through the passage *l*.

Although the patentee prefers to use three flexible partitions, this invention may be applied to meters constructed with a different number of flexible partitions.

The patentee claims the so constructing and applying rotatory valves to dry gas-meters that the gas is not allowed to pass into the compartment wherein the apparatus or works are contained, as above described.—[*Inrolled in the Inrolment Office, November*, 1846.]

To Isaac Henry Robert Mott, *of No.* 96, *Strand, in the county of Middlesex, piano-forte maker, for improvements in the construction of musical instruments, whereby they are rendered much more durable, much more capable of resisting the injurious and destructive effects of the atmosphere (especially of extreme climates), and whereby the quality of their tone is greatly improved, and remains good for a much longer period.*—[Sealed 28th April, 1846.]

This invention "consists of and is accomplished by means of metallic skeletons, vertebral columns or frames (or other substance or substances, material or materials), so formed or applied in piano-fortes (or other stringed instruments), as that they can resist most effectually the immense pressure or strain (which is occasioned by the tension of the wires or strings), in a direct or perpendicular manner or position: thus, whatever variations of heat or cold may expand or con-

tract the wires or strings, likewise expands or contracts the metallic skeletons, columns, or other apparatus; and thus the pitch is much more uniformly preserved."

In order that the invention may be readily understood, the patentee first describes the chief parts of a small piano-forte, constructed in the usual manner. Fig. 1, in Plate II., represents a transverse vertical section of the piano-forte. *a*, is the wrest-plank, in which the wrest or tuning-pins *b*, are fixed; *c*, the bracing or skeleton part of the instrument; *d*, the bridge of the wrest-plank; *e*, the sounding-board or belly; *f*, the belly-bridge; *g*, the strings, resting on the bridges *d*, and *f*; *h*, the hitch-pin block, that receives the hitch-pins *i*, to which the lower ends of the strings are secured. It will be evident, that when the enormous pressure or strain of many tons is exerted by drawing up the strings to concert pitch, the bracings must be forced out of their original rectilinear figure into a curvilinear form (as indicated by the dotted line *j*,); which the patentee states is the case, more or less, with all instruments, unless advantage be taken of the strong parts of the case, on which the key-frame is laid, by connecting the bracings thereto, by means of screw-bolts, passing freely through the sounding-board, as shewn by the dotted lines *k*.

Fig. 2, is a front view, and fig. 3, a transverse vertical section of so much of a piano-forte as is requisite to exhibit the application of this invention. *c*, *c*, represent the metallic skeleton or vertebral columns, placed as nearly as possible in a direct line with the face of the wrest-plank *a*, (into which they may be sunk,) or in any other convenient position. The length of the metallic skeleton is equal to that of the strings, or to the vibrating parts of them, or thereabouts; for this metallic skeleton-work is capable of much variation, and may be used either complete or incomplete, or with some part or parts added, or it may stop short and butt against the edge of the wrest-plank; but the patentee prefers to carry the upper ends of the vertebral columns to the wrest-plank bridge, and connect their lower ends with the hitch-pin plate. Notches are cut in the wrest-plank bridge for the reception of the strings, in order to obtain a firm support for them, and obviate the necessity of drilling and

inserting pins into the wrest-plank bridge. *e*, is the sounding-board or belly, and *f*, the belly-bridge, which is cut out, so as to allow the metallic columns to pass freely through it, without danger of touching in any part. The resistance offered by the above arrangement to the pressure or tension of the strings is infinitely more powerful and effectual than that of the wood bracings *c*, fig. 1, however bulky.

Variations may be made in the form of the metallic skeletons, columns, frame-work, or other substances; for instance, they may be circular, semicircular, oval, triangular, or oblong. In piano-fortes, made as above described, the distance from front to back is much less than in those of the ordinary construction, as will be readily perceived, on comparing the transverse sections figs. 1, and 3.

The patentee proposes to call those instruments which are manufactured according to his invention, the *chrysargyreochord* pianos, or other musical instruments.—[*Inrolled in the Inrolment Office, October*, 1846.]

To Graziano Contè, *of* 127, *Regent-street, in the county of Middlesex, engineer, for certain improvements in machinery for cutting, carving, and sculpturing marble, stone, wood, and other like substances,—being a communication.* —[Sealed 3rd October, 1845.]

This invention consists in a peculiar combination of mechanical parts, forming a machine or apparatus whereby perfect facsimiles of models or casts may be produced in marble, stone, wood, or other like substance.

In Plate III., fig. 1, shews a perspective view of the machine or apparatus for producing busts and other works in sculpture. A, is a column or pillar, firmly fixed in a vertical position; upon this column are made to slide two collars or rings B, B, having projecting pins, through each of which is made to pass a set screw C, C, for supporting a rectangular or oblong frame D; there are also set-screws C^1 C^1, for fixing the rings in any required position upon the column. Each of these rings has also a projecting feather or key, which is

made to slide in a groove cut in the column, the object of which is to keep the frame D, D, always in a vertical position. E, E, is also a rectangular or oblong frame, supported by and attached to the frame D, by two screws or centres passing through the end of such frame. It will be observed, that each of these frames is suspended, as it were, on an axis or centre, and they are capable of moving upon such axis in the same manner as a door moves upon its hinges. F, is a cross-bar, fixed in the frame E, by two set-screws F^1, forming centres, upon which the bar moves; G, G, are two beams, having holes bored through the middle part thereof, and are suspended or attached to the cross-bar F, by two pins or studs G^1, G^1, upon which the beams move as upon an axis. At the upper end of the beams G, there is a cross-bar H, and at the lower end is a cross-bar I, I, supporting the frame K, K, hereafter described. The two bars H, and I, are attached to the beams G, G, by pin-joints, so as to admit of the beams forming the parallelogram G, H, G, I, moving freely, either in one direction or another, that is to say, either backward or forward, up or down, or in a lateral direction, thus forming, as it were, an universal joint, as will be clearly understood. L, is a pillar or column, firmly fixed to the floor, and support ing one end of a cross-bar M; the other end being fixed in any convenient manner to the pillar A. N, N, are two studs or projecting pieces, bolted to the bar M. Each of these studs has a hole through it, to allow a bar O, O, to slide freely therein. This bar supports at each end a socket or tube P, P, and within each of these tubes slides a vertical rod, attached at its upper end to a cross-bar Q, which latter is attached to the frame E, E, so as to move freely upon its axis. The object of this arrangement is to keep the frame E, E, during its motion backward and forward, in the same parallel plane.

The action of this part of the apparatus is as follows:—Supposing it were required to move the parallelogram G, H, G, I, in a position at right angles to the frame E, E, it is evident that such would easily be accomplished, in consequence of the beams G, G, moving freely upon an axis at G^1, G^1; it will also be apparent that the ends of the bars G, G,

can be raised or depressed, in consequence of the cross-bar F, moving freely upon an axis at F^1, F^1, during the backward and forward movement. The frame D, D, moves upon its axis at B, B, and carries with it the frame E, E, which, in consequence of the arrangement of parts hereinbefore described, and marked with the letters N, O, P, Q, always remains parallel with the fixed bar M. For instance, if the frames D, D, E, E, and G, G, were moved backward or forward, the rods would be withdrawn from the tubes P, P, and the bar O, would slide endways through the studs N, N; the bars Q, and O, would also partly rotate on their axes, and thereby allow the frames E, E, D, D, and G, G, to move in the manner before described; so that in whatever position the frames D, D, and E, E, be placed, the latter will always move through planes which are parallel to each other—this will also be the case with regard to the cross-bar I, of the parallelogram G, H, G, I, to which is attached a rectangular frame K, K, for carrying the cutters, of which the following is a description:— *a, a,* is a screw-bolt, having at one end a right-hand screw, and at the other end a left-hand screw; this screw-bolt has a boss in the middle with holes through it, so that by turning the screw (which may be done by putting a lever in one of the holes), the frame K, K, will be firmly secured to the cross-bar I, and may, by means of such screw, be fixed at any desired angle to the aforesaid cross-bar I. *b,* is a shaft supported in suitable bearings *c, c,* attached to the frame K, K, by means of bolts; this shaft is driven by an endless band *d, d,* passing over guide-pulleys *e,* under guide-pulleys *f,* and *g,* and round the driving-pulley *h.* The frame supporting the guide-pulleys *f,* is attached to and moves with the frame D, D. The guide-pulleys *e,* are shewn in the drawing as being above the shaft *b,* but it will be evident that the same would act equally well if placed below such shaft. Upon the end of this shaft is fixed a pulley for receiving the endless band, and to this pulley two tappets are fixed, for giving motion to the chisels or tools which rough out the block of marble in the first instance, and afterwards finish it by means of a rose-bit or other suitable tool fixed in the rotary shaft *b.*

Fig. 3, shews a plan, and fig. 4, an end view of the shaft

and tappets for working the cutters; *b*, is the shaft, upon the end of which is keyed a pulley *i*, for giving motion to the shaft by means of the gut or band *d*, *d*, as hereinbefore described. Upon one side of this pulley are firmly fixed two tappets *k*, and *l*, which, during the rotary motion of the shaft, alternately come in contact with the projecting ends of the tools or chisels k^1, l^1. It will be observed, on referring to the drawing, that the tappet *k*, is placed further from the centre of the shaft than the tappet *l*, so as to correspond with and act alternately on the projecting ends of the tools. The tappet *l*, is shewn as having raised or drawn back the tool l^1, which, after the tappet has passed the projecting end of the tool, is, by means of the spring *m*, forcibly struck against the block of marble or other substance, supposed to be at *o*. *n*, is a spring for acting upon the tool k^1, which, as the shaft *b*, revolves, will be acted upon by the tappet *k*, in a similar manner to that last described. It will be evident that two, four, or more tools may be employed, if found desirable, by having an equal number of tappets, which may, when required, be placed on both sides of the pulley *i*. In fig. 1, the position of the springs *m*, *n*, for actuating the chisels, is shewn. The springs are firmly fixed to a projecting piece *p*, attached to the frame K, K; the opposite ends of the springs being attached to the chisels k^1, l^1, by means of small steel studs or pins. *q*, *q*, is the guide-frame, which consists of two sliding-bars passing through the side or end of the frame K, K, and through projecting pieces *r*, *r*, *r*, *r*, attached to the frame K: these sliding-bars are capable of being withdrawn, and set at any given distance from the frame K, K. *s*, *s*, is a spindle or guide, passing through the ends of the bars *q*, *q*, and may also be fixed at any required position by set-screws *t*, *t*. This guide-bar or spindle may therefore be set to correspond with the chisels or rotary cutter, as may be required. *u*, *u*, is a lever, one end of which is attached, by means of a swivel-joint, to a vertical column or pillar *v*; and near the end of this lever there is a projecting pin or stud which connects it to the frame K, K: the object of this lever is to bring the frame K, K, and tools, up to the work, or remove them from it, as will be hereafter described. R, R^1, are two

tables, each of which is fixed on the end of a vertical crank-shaft S, S¹, supported by suitable frame-work T, T; and these cranks are connected together by means of rods U, U. V, is a wheel keyed on the end of a horizontal shaft, having at the opposite end a small bevil-wheel which gears into and works a bevil-wheel (not shewn in the drawing), keyed on the shaft S, and fixed just below the table R; so that by turning the wheel V, a slow rotary motion will be given to the two tables R, R¹, both of which will move through an equal space, owing to the shafts being connected together by the rods U, U, as described.

The action of the machine is as follows:—On the table R¹, and opposite the cutting-tools, is firmly fixed the block of marble to be operated upon; and upon the table R, is also secured the cast, bust, or object to be copied. The spindle *s*, *s*, of the guide-frame *q*, *q*, is then placed at a distance from the chisels, equal to the distance between the centres of the two shafts S, S¹. Motion is then communicated to the driving-pulley *h*, which gives motion, by means of the band *d*, to the shaft *b*; and thus motion is imparted to the chisels k^1, l^1, which are brought in contact with the block of marble or other substance fixed on the table R¹, by means of the lever *u*, *u*. The distance to which the cutter-frame will be moved forward is governed by the guide-spindle *s*, *s*, which comes in contact with the external surface of the figure fixed on the table R. This table can be moved round as required by the wheel V, and during such movement the chisels are cutting or working out the block of marble or other substance into the form of the bust or cast fixed on the opposite table R¹. After the block has been roughed out to the proper form, it is finished with a rose-bit, or other suitable rotary cutter, fixed in the shaft *b*; the guide *q*, *q*, and spindle *s*, *s*, being first set, so that the distance between the point of the spindle *s*, *s*, and point of the tool will be equal to the distance between the centres of the shafts S, S¹.

The patentee claims, Firstly,—the general arrangement and combination of parts shewn and described with reference to the drawings. Secondly,—the application of the frame K, K, with the combination of parts therein shewn, for the

purpose above described. Thirdly,—the application of tappets, together with the springs for working the chisels, as hereinbefore described. And, Fourthly,—the mode of imparting rotary motion from the crank-shaft s, to the crank-shaft s^1, by means of two or more connecting-rods, as described.—[*Inrolled in the Inrolment Office, March,* 1846.]

To John Gillett, *of Brailes, in the county of Warwick, agricultural implement maker, for an improved apparatus for protecting property, by sounding alarums or giving signals.*—[Sealed June 22nd, 1846.]

This invention relates to the construction and employment of alarums for protecting property, such as grain, fruit, or vegetables, from the depredations of birds and small animals; by being placed in fields where grain has been newly sown, or in trees, gardens, orchards, or other places, where fruit, vegetables, or other produce are liable to the depredations of birds or animals. The alarum apparatus is constructed in such a manner as to give a loud report at stated periods, such as at every hour or half-hour; and this it will continue to do for some hours after being properly wound up or set. In Plate III., the improved apparatus is shewn in several views. The apparatus consists of two principal parts, viz., first, a clock movement, upon which the length of the intervals, between which the alarum is sounded, depends, and which is, in fact, the prime mover of the apparatus; and, second, the alarum apparatus, or that part which causes the sound or report at the stated intervals. The alarum part of the apparatus may be modified in various ways, some of which are shewn in the drawings; but the invention consists in adapting a clock-movement to the alarum apparatus, in such a manner that the alarum may be sounded at stated intervals, for a given number of hours. The alarums employed by the patentee are percussion or detonating caps, of such a size and description as will, upon receiving a blow from the hammer of the apparatus, explode with a loud report; or smaller caps, mounted on nipples, in connection with small charges of

gunpowder, suitably arranged round a barrel, are employed. By this means a loud explosion is produced, whenever one of the caps is, by the movement of the clock, brought under the action of the hammer. In some cases the patentee employs a large bell in place of the explosive compounds, which bell, by being struck at stated intervals by a suitable apparatus, will emit a sufficiently loud and continuous sound to alarm or scare away birds or small animals, that may be depredating upon the produce of the land in the vicinity.

Fig. 1, represents a front elevation of one modification of the improved alarum, and fig. 2, is a partial transverse vertical section. *a, a,* is the barrel of a clock, containing a very strong convolute spring; *b, b,* is the spiral chain-barrel, round which the chain, cord, or catgut is coiled, when the apparatus is wound up; *c,* and *c**, are the escapement-wheel and balance; and *d, d, d,* part of the ordinary train of wheels of a clock movement, by which the force of the spring in the barrel *a,* is made to act upon a large toothed wheel *e,* on the shaft or axle *f,* which carries a star-wheel *g,* and a cast-iron cylinder or barrel *h,* called the alarum cylinder or barrel. These two parts (the star-wheel and alarum cylinder) are locked together by means of studs or feathers 1, fig. 2, in order that they may revolve simultaneously; and a number of holes *i, i, i,* are bored in the face of the alarum barrel to a suitable depth, to receive charges of gunpowder, which are ignited and exploded by means of percussion or detonating caps, placed on the nipples 2, 2, 2, as shewn in the figures. A hammer or striking-piece *j,* is mounted on an axle immediately above the caps, and a small friction-wheel 3, near the end of the hammer, is made to work against the curved or inclined sides of the arms of the star-wheel *g, g,* as seen best in fig. 1. It must now be understood, that as the cog-wheel *e,* and star-wheel *g,* together with the alarum barrel *h,* are carried slowly round by the power of the main-spring in the barrel *a,* the hammer *j,* will be raised up by the inclined sides of the arms of the star-wheel; and immediately that the small friction-roller 3, at the end of the hammer passes over the extreme point of the arm of the star-wheel, the hammer will, by the power of a convolute spring in the small barrel *k,* be brought

down with force on to the top of one of the caps, which will be exploded by the percussion, and ignite the charge in one of the holes of the alarum cylinder, and thereby occasion a report sufficiently loud to scare away any birds or small animals that may be within hearing. When one charge has been fired off, the star-wheel *g*, and barrel *h*, will continue to move round, and the hammer will be again raised in the same manner for another explosion; and this will take place periodically until all the charges are fired off. In order to prevent accidents to persons who may be near when a charge is being exploded, the star-wheel *g*, and barrel *h*, are covered with a metal shutter *l*, *l*, (see fig. 2,) leaving a hole 4, for the wadding to pass through; and by this means the exploded caps are prevented from flying out, which they will sometimes do with great force.

Fig. 3, is a front view, and fig. 4, a plan view of a modification of the above apparatus, in which the star-wheel *g*, is dispensed with, and the hammer is raised in a different manner. A large toothed-wheel *g*, is mounted on the shaft *f*, of the alarum-barrel *h*, which is bored out in holes to receive the charges of the powder, and is furnished with nipples and percussion caps, in precisely the same manner as the former apparatus. The axle of the hammer is furnished with a convolute spring in the barrel *k*; and at the opposite end of the axle of the hammer a curved or inclined lever *m*, is mounted, as shewn by dots in fig. 3. The toothed-wheel *g*, is furnished with a number of studs or rollers *n*, *n*, *n*, corresponding in number with the caps 2, and holes *i*, *i*, in the alarum-barrel; and as the large wheel *g*, is carried round in the direction of the arrow, by the power of the main-spring of the clock-movement, the rollers *n*, *n*, are brought against the under side of the lever *m*, and thereby raise it and the hammer, as seen at fig. 3; and immediately that the end of the lever *m*, is released from the roller, the hammer, by the power of the spring in the small barrel *k*, is brought down with force on to the cap on one of the nipples, whereby the charge is exploded.

In his specification the patentee describes a simplified apparatus, wherein charges of powder are dispensed with, and

percussion caps of a larger and more powerful description are employed in lieu thereof. These caps are intended to be exploded periodically, by means of a hammer, actuated by a clock-movement, as before; but it has not been thought necessary to shew the clock-movement in connection therewith, as the mode of adapting it will be evident.

At figs. 5, and 6, a further modification of the apparatus is exhibited. In this arrangement, detonating or explosive compounds are altogether dispensed with, and the alarum is produced by striking a bell, by a little apparatus which is put in rapid motion for a short time, for the purpose of sounding an alarum of one or two minutes duration, more or less. Fig. 5, represents a transverse vertical section, and fig. 6, a plan view of the apparatus, the bell only being shewn in section. The prime mover of the whole apparatus is, as in the former instances, a strong main-spring, and the time at which the alarum is sounded is regulated by a clock-movement as before. The works or movement-part of the apparatus are enclosed in a wooden or other box A, A; and B, is the bell which, upon being struck, sounds the alarum. *a*, is the barrel which contains the main-spring, upon the axle of which is mounted a toothed-wheel *b*, *b*, for communicating motion, through the ordinary train of wheels, to the escapement and balance, as is well known. *c*, is a vertical shaft, placed beside the spring-barrel, and carrying, at its upper end, a horizontal arm *d*, the outer end of which is kept in contact with the periphery of a horizontal disc-wheel *e*, by means of a small spring 4. The vertical shaft *c*, also carries a second short arm *f*, which projects under the horizontal toothed-wheel *b*, and is moved back as this wheel *b*, rotates, by means of small pins or studs 5, on the under side thereof, as seen in fig. 5. A second convolute spring *g*, connected with a second train of wheels *h*, *h*, *h*, is attached to a vertical spindle *i*, *i*, which supports the bell B. It will be understood, on inspecting the drawings, that the train of wheels *h*, *h*, connects the spring *g*, with the disc-wheel *e*, which would commence rotating with great rapidity immediately that the spring *g*, is wound up, if some intervening obstacle did not prevent it. The wheel *e*, is prevented from so rotating by a small stud or projection 6,

on its periphery, coming in contact with and bearing against the end of the horizontal arm *d*, of the vertical shaft *c*, as seen best in fig. 6. The spring of the barrel *a*, is wound up by applying a key to the square head *p*, at the lower end of the shaft; and the other spring *g*, is wound up by turning the milled nut *k*, above. When the clock-movement, in connection with the spring *a*, is set in action, the pins or studs 5, on the lower side of the toothed-wheel *b*, will, by coming against and forcing back the short arm or lever *f*, of the vertical shaft *c*, also force back the longer arm *d*, above, and by that means release the stud or projection 6, of the disc-wheel *e*, which, being thus freed from obstruction, and being powerfully acted upon by the spring *g*, will commence rotating with great rapidity in the direction of the arrow; and the effect of this will be, that the two hammer-blocks *l*, *l*, (which are mounted loosely on studs or pins on the upper side of the disc-wheel) will fly out by centrifugal force, and strike the inner side of the bell a series of rapid blows, thereby occasioning a great noise; but immediately that the stud 5, of the toothed-wheel *b*, gets past the end of the short lever *f*, (which it will do in about one minute) the lever *d*, on the upper end of the shaft will be again forced into contact with the periphery of the disc-wheel *e*, by means of the small spring 4, and will thereby stop its further rotation until the projection 6, is again released.

In conclusion, the patentee observes, that he is aware of apparatus having been employed in which bells were sounded at a certain period, by means of clock-work; he does not therefore mean or intend to claim the exclusive right to sound alarums on a bell or bells, by means of clock-work; but that which he claims is, First, exploding or firing off, at stated or regular intervals, a succession of charges of detonating or explosive compounds, in any convenient or suitable shape, by means of a self-acting apparatus in which the length of the intervals in sounding the alarums is regulated by clock-work, and the hammer or lever (which, by striking the detonating compound, causes the explosion) is released at the proper moment; and, Secondly,—sounding a series of alarums on a bell at stated intervals, by means of a self-acting

apparatus, in which the length of the intervals or times at which the succession of alarums are sounded, is regulated by clock-work, for the purposes above-mentioned.—[*Inrolled in the Petty Bag Office, December,* 1846.]

Specification drawn by Messrs. Newton and Son

To MARK ROLLINSON, *of Brierly Hill, Dudley, in the county of Stafford, engineer, for certain improvements in steam-engines.*—[Sealed 7th May, 1846.]

THE object of this invention is to assist the ordinary steam cylinder of the engine in working the air-pump; and for this purpose the patentee proposes so to construct the latter, that steam may be admitted into the working cylinder and into the cylinder of the air-pump simultaneously, and thus act on both pistons during the down or up stroke of the air-pump.

In Plate III., is a sectional elevation of an air-pump, and the parts in connection therewith, suitably constructed for admitting steam during the down stroke; but this arrangement may be varied, in order to admit steam for producing the up-stroke of the air-pump, instead of the down-stroke. *a*, is the cylinder of the air-pump, containing the solid piston *b*, and communicating at the upper part with a steam-chest *c*; in this steam-chest is a slide-valve, worked by a rod *d*, which is attached at the top to a bell-crank lever, connected with a rod from an excentric on the main shaft of the engine. The steam-chest *c*, is supplied with steam by the pipe *e*, and the slide-valve is so adjusted that it will permit the steam to enter the upper portion of the cylinder of the air-pump, through the passage *f*, during the down-stroke; but, during the up-stroke, a communication is established, by the slide-valve, between the passage *f*, and the opening into the pipe *g*, by which the eduction steam is conducted into a box or chamber leading to the condenser,—the eduction steam from the working cylinder is also discharged into this box or chamber. The lower part of the air-pump cylinder performs the office of an ordinary air-pump, communicating with the condenser by the passage *h*, and with the hot-well by the passage *i*.

In conclusion, the patentee states that he can work the steam at either high pressure or low pressure with this apparatus. He does not confine himself to the above details, provided the peculiar character of his invention be retained; but he claims the so constructing the air-pump of steam-engines that it may have its piston actuated by steam in its cylinder, simultaneously with the piston in the working cylinder, as above described.—[*Inrolled in the Inrolment Office, November,* 1846.]

To John Maddock, *of Burslem, in the county of Stafford, earthenware manufacturer, for a new and improved method of building and constructing kilns or ovens used by potters and manufacturers of china and earthenware.*—[Sealed 25th February, 1846.]

This invention relates to the construction of those kilns or ovens which are known by the name of "hardening on" kilns, and consists in building two kilns or ovens together, one above the other, so that the waste heat or fire from the lower one may be made to heat the upper one.

Fig. 1. Fig. 2. Fig. 3.

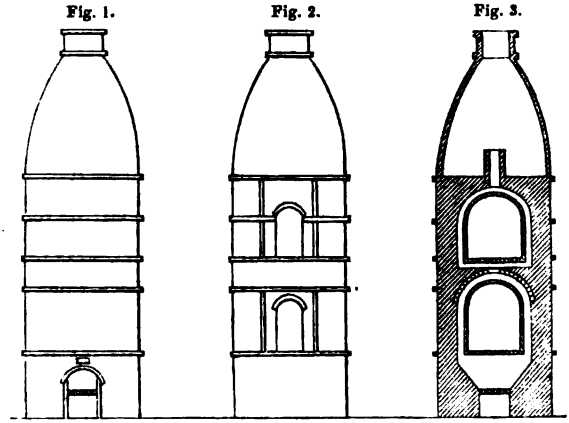

Fig. 1, is a front elevation; fig. 2, a back elevation; and fig. 3, a vertical section of two kilns or ovens, constructed according to this invention.

In these figures it will be seen that the masonry is girt

with strengthening bands of iron. The fire-place is immediately beneath the lower kiln, which is supported by arches; and around the kiln is a flue, which conducts the flame and heated gases from the fire-place up to the second kiln. This kiln is in like manner supported on arches, and is surrounded by a flue, communicating at its lower part with the lower flue by an opening, as shewn in fig. 3; and at its upper part it is provided with a vent, which conducts the gases into a chamber above; whence they pass off into the atmosphere. At fig. 1, the fire-door is shewn; and at fig. 2, the openings for introducing the pottery into the kilns, are represented.

The patentee claims the building or constructing of what are usually called "hardening on" kilns, with two kilns or ovens one over the other, as above described, so that the waste heat or fire arising from the lower kiln or oven may be made to heat or fire the upper kiln or oven, whereby a great saving of fuel and time is effected.—[*Inrolled in the Inrolment Office, August,* 1846.]

To Joseph Seraphin Fauçon, *of Rouen, in the kingdom of France, banker, for improvements in combining materials to be employed in fulling cloth.*—[Sealed 29th June, 1846.]

This invention consists in substituting a combination of caustic potash water and tallow oil for the common soap used in fulling cloth.

The caustic potash water and tallow oil may be combined in the following proportions:—100 lbs. potash water at 1.16 and 50 lbs. tallow oil; or 100 lbs. potash water at 1.20 and 60 lbs. tallow oil; or 100 lbs. potash water at 1.24 and 72 lbs. tallow oil; or 100 lbs. potash water at 1.27 and 80 lbs. tallow oil; or 100 lbs. potash water at 1.30 and 87 lbs. tallow oil. The quality of the material produced from 100 lbs. of potash water at 1.30 and 87 lbs. of tallow oil is superior to that made with 100 lbs. of potash water at 1.16 and 50 lbs. of tallow oil, or any other of the mixtures above mentioned. Caustic potash water can be used above 1.30 and under 1.16; and the quantity of tallow oil employed may also be augmented or diminished. In order to mix the two ingredients, the potash water, in a cold state, is introduced into a barrel

or other suitable vessel, and the tallow oil being then added, is mixed therewith by stirring; when the ingredients are thoroughly incorporated, the mixture is allowed to rest from twelve to eighteen hours; it is then stirred again, if there is any separation, and afterwards left for one or more days. The compound thus produced is to be employed in the process of fulling, in the same manner as when common soap is used.

The patentee claims the application of a combination or composition of tallow oil and potash water in the process of fulling cloth.—[*Inrolled in the Inrolment Office, December,* 1846.]

To Harold Crease, *of Brixton-hill, in the county of Surrey, paper stainer, for certain improvements in the preparation of paints and colors for decorative and other similar purposes.*—[Sealed 23rd July, 1846.]

This invention relates to certain improvements in the preparation of paints or colors, whereby they are rendered suitable to be used in a similar way to that description of painting termed by the trade "flatting or dead white;" and the colors so prepared will be free from any offensive smell, dry quickly, and be ready to receive a second coat within an hour after the application of the first. The improvements consist in combining shellac, gelatine, and animal or vegetable oil, with an alkaline base, and incorporating this mixture with ordinary paint.

The mode of carrying out this invention is as follows:—Two pounds and a half of well-bleached shellac and half a pound of borax, or any other suitable alkaline base, are boiled in five quarts of water until dissolved; the boiling is still continued until the solution is reduced in bulk to about one gallon. To one quart of this solution, from half a pint to a pint of pure gelatine, according to its strength, and four drachms of alcohol are added, and gradually incorporated therewith by the application of heat. This mixture is then added to the remaining portion of the solution, above mentioned, together with the requisite quantity of white lead to give it a body, and a small quantity of well-bleached oil;

the latter ingredients being added in the proportion of nine pounds of white lead and two ounces of well-bleached oil to each quart of the solution. This mixture is ground in an ordinary paint mill, and afterwards thinned with a solution of shellac: it is then ready for use.

The above preparation is applicable to all paints or colors used by artists and painters, with the exception of a few which contain iron in combination with other substances as a base.

The patentee claims, as his invention, the mixing, combination, and use of the different ingredients, in the proportions and quantities (or as near as may be) above described, whereby he is enabled to manufacture a paint which is free from offensive smell, and which will be sufficiently dry within one hour to admit of another coat being laid on.—[*Inrolled in the Inrolment Office, January,* 1847.]

Scientific Notices.

ON A METHOD OF PRODUCING LIGHTS AND SHADES IN EQUAL PERFECTION, IN DAGUERREOTYPE PICTURES.

BY M. M. BELFIELD LEFEVRE AND LEON FOUCALT.

(*Translated for the London Journal.*)

It was observed soon after M. Daguerre had made known his wonderful discovery, that the iodized plate was not suited for producing a perfect image of every object, but that if there was a great variety of light and shade, *i. e.* very light and very dark parts, they would not be simultaneously brought out with correctness; one of these two alternatives must be chosen:—either to stop the process when the light parts of the picture are brought out (in which case the dark parts will not be clearly distinguishable), or to allow the light to act for a longer time, in order to render the dark parts distinct; but in this case the light parts will be rendered indistinct, or, as it is called, burnt.

These evils have fortunately been remedied by the employment of certain substances, which not only allow of the operation being performed with greater rapidity, but also produce sensitive surfaces capable of receiving a much greater variety of tints. These are, however, far from being perfect, and therefore if any process could be discovered which would bring out the light and dark parts of the picture with equal distinctness, without increasing the sensitiveness of the plates, it would be advisable to have recourse to it in certain cases. If the operator knows how to work well upon these different sensitive surfaces, without con-

fining himself exclusively to the most sensitive, he will be able to produce any effect desired; for instance, if requisite, he will moderate the intensity of the rays of the sun, bearing upon objects of inadequate reflective powers; or heighten the tone of a picture.

With a view to facilitate the attainment of good results, Mr. Belfield and myself determined on making known a new mode of preparing the sensitive surfaces, the effect of which is to impart to the plates the property above mentioned, and which assimilates them to the human retina.

Our method requires the employment of iodine and bromine, and is easily performed by persons who are accustomed to employ those substances separately. It consists in polishing and iodizing the plate in the ordinary manner, and afterwards causing it, by any convenient means, to absorb three times as much vapor of bromine as is usually thought sufficient to render the plates as sensitive as possible. Whilst the ordinary quantity of bromine does not visibly alter the tint of the iodized layer, that which we recommend here causes it to assume a deep bluish violet tint.

The sensibility of the plates thus surcharged with bromine is reduced to a third of what it would be if the ordinary quantity only were used, but at the same time they are rendered capable of producing a perfect picture of subjects presenting the greatest variety of shade. This will be seen by inspecting a small picture, presented herewith, which was produced when the sun was shining. There will be perceived the clouds in the sky, white houses, with the shadows well defined, and trees, the foliage of which is delineated much in the same manner as if executed by an artist.

We recommend the ordinary quantity of bromine to be exactly tripled, as if less than this quantity be used, the picture will not be properly brought out; and if more than this quantity were used, the mercury would not be properly condensed, and the image would not be so well defined.

This new property, communicated to the iodized plates by an excess of bromine, may be very usefully applied; and besides, as it appeared to us that this statement might be useful to the chemical world, we have been induced to make this communication to the Academy.—[*Comptes rendu des Séances de l'Académie des Sciences.*]

OBSERVATIONS ON THE EXPERIMENTS OF MESSRS. FOUCAULT AND FIZEAU, RELATIVE TO THE ACTION OF THE RED RAYS UPON DAGUERREOTYPE PLATES.

BY M. EDMOND BECQUEREL.

Messrs. Foucault and Fizeau, at the sitting of the Academy on the 5th inst. (October, 1846,) presented some observations concern-

ing the action of the red rays upon Daguerreotype plates, from which it would appear that the least refrangible part of the solar spectrum acts upon the iodide of silver in an inverse manner to the most refrangible portion. As it appears that these gentlemen are not acquainted with the experiments which have been made during the last few years on this subject, and as the results stated by them do not appear to me to lead to the conclusions which they deduce, I take the liberty of submitting some remarks thereon to the Academy.

Mr. Draper (*Philosophical Mag.*, Nov. 1842) on examining the image produced by the action of the spectrum upon iodized plates of silver, made known, before these gentlemen, the existence of protecting rays modifying the influence of the solar rays, and even acting negatively upon the iodide of silver. Mr. Herschel examined the pictures on that occasion, and, in a very interesting experiment (*Philosophical Mag.*, Feb. 1843) on the different appearances which the iodized plates assume when exposed for the same space of time to varying in intensity the light, and submitted to the vapor of mercury, attributed these effects to the unequal thickness of the substances deposited upon the plates of silver serving as reflecting surfaces. He shewed, moreover, that on operating upon paper covered with iodide of silver, nothing was observed which indicated the action of negative rays, but that all the active parts of the solar spectrum acted chemically in the same manner on the iodide.

The experiments which I have made on the chemical action of the solar rays, from 1841 to 1844, have all led me to the same conclusion. Attention ought not therefore to be directed to the deposits formed on the surface of Daguerreotype plates, as if these were the only data to lead to the conclusion that the rays acted in various ways; for if so, there would be risk of defective results.

In support of the foregoing, I will cite the following experiment, of the accuracy of which any person will be able to judge. "Let a Daguerreotype plate be prepared with iodine only (in order to avoid the admixture of active substances), and let the blue, indigo, and violet parts of a purified blue spectrum, presenting Fraunhofer's black lines, be thrown upon it; if the action only lasts a short time, after submitting it to the mercury vapor, the black lines will be seen to fix themselves upon a white ground, which represents those parts effected by the active parts of the spectrum." * But if the plate be exposed to the spectrum for an hour or more, then the appearance of the plate changes, on passing it through the mercury vapor; the lines of the spectrum are scarcely marked, and the action has been nearly uniform throughout its surface, but the lines which are visible appear

* "E. Becquerel on the Constitution of the Solar Spectrum."—*Universal Library of Geneva*, August, 1842.

white, and shew very distinctly upon the ground, which approaches to blackness: the effect is quite contrary to what it was before. That portion of the plate which is acted upon by the violet part of the spectrum has, under these circumstances, the same appearance as the portion of the plate exposed to the red rays by Messrs. Foucault and Fizeau; and to produce this effect, it was only necessary to vary the time of exposure of the plate to the same portion of the spectrum. Must it be inferred, in the second case, that the iodide of silver had been acted upon by negative rays? Certainly not; for if the experiment be repeated upon iodide of silver laid upon paper, the paper will become darker and darker, in proportion to the time it continues exposed to the spectrum: and, besides, I have found (*Annales de Chimie et de Physique*, 3rd series, Vol. IX., p. 268, *et seq.*) that the electrical effects arising from the chemical decomposition of the iodide always act in the same direction.

It will be seen that the conclusion to which Messrs. Foucault and Fizeau came, viz., that there exist, in the red prismatic rays, negative rays—cannot be received, simply from the fact that the Daguerreotype plates are not always the same in appearance. The contrary effects, as will be seen hereafter, are secondary effects produced by several chemical re-actions taking place simultaneously, and are not due to contrary action, exercised on the part of the solar rays, on the iodide of silver alone.

Another fact which I will call attention to is, that the least refrangible part of the spectrum, instead of possessing a negative action upon the iodide of silver, exercises a continuous influence upon most of the salts of silver alone, such as the iodide, the bromide, and the chloride; and also that the experiments upon which this proposition is founded have been verified by the Commissioners of the Academy, charged with the examination of one of my memoirs.

In the foregoing, the only point discussed was the influence of light upon iodide of silver, or the simple salts of that metal. When plates of silver are exposed successively to the vapors of iodine, bromine, or chlorine, the mixtures obtained may give rise to various kinds of chemical re-action, of which the result only is appreciable. For this reason these mixtures must not be employed without great caution, and the Daguerreotype plates must be used as little as possible, in experimenting as to the nature of the active rays.

In order to shew how far the mixture of sensitive materials is capable of influencing the effects of the spectrum, I will direct attention to the following observation of Mr. Herschel:—

If paper be prepared, first with a strong solution of lead, and afterwards with bromate of potash and nitrate of silver, a surface will be produced, which will speedily become black on exposure to the light; on being presented to the spectrum, the black tint will be produced in the most refrangible rays, as far as green.

But if the paper has been blackened by previous exposure to the light, on being covered with a dilute solution of iodide of potassium, and exposed to the blue part of the spectrum, the paper will become white. This result proves that the iodide of potassium is decomposed, and that the silver which stained the paper being iodized, and coming in contact with an alkaline iodide, ceases to be affected by the light; the paper will therefore remain of a yellowish white in that portion of the spectrum on which the re-action takes place.

If the layer of iodide of potassium employed is produced from a dilute solution of that salt, the paper not only becomes white in the violet part of the spectrum, but also becomes darker in the red rays, and even beyond; a neutral line being in the middle. It would appear therefore, from an examination of the image thus obtained, that two contrary results were produced; viz., the destruction of the color in the violet part, and its augmentation in the red. These effects may be easily explained as two distinct chemical re-actions:—first, the action of the light upon the iodide of silver, the coloring of which had commenced; second, the action of the light to effect the decomposition of the iodide of potassium, and the iodizing of the silver arising from the sub-iodide formed by the first re-action. As the red part of the spectrum contains those rays which continue the chemical action commenced upon the salts of silver, and as the first re-action is only commenced, the latter has most influence in that part of the spectrum. The second re-action is, on the contrary, at its height in the violet. Thus these appearances of inverse action in the coloring do not arise from two distinct effects, *positive* and *negative*, produced by the rays upon the same sensitive surface; but are owing to two distinct chemical re-actions, which predominate respectively in the red and violet parts.

If the blackened paper be covered with a fresh layer of iodide of potassium, it will begin to turn white at the least refrangible part, and the neutral line will again approach the red; if a sufficient quantity of iodide be used, the paper will turn white from the violet to the red; but if a very strong solution of iodide were employed, the paper would whiten, even in the dark: so violent is the action of the iodide of potassium upon metallic silver.

These results clearly prove that several chemical actions may take place simultaneously in the mixtures of sensitive substances, the results only of which are observable. Analogous effects must necessarily be produced on employing iodized plates of silver, and afterwards exposing them to the vapour of bromine or to chlorine; and perhaps even when using plates iodized according to Mr. Daguerre's plan. In fact, under these circumstances, the iodide, chloride, or bromide of silver are in direct contact with the metallic silver; and as, by the decomposition of these salts, through the action of the light, sub-salts are formed, the result is, that iodine, chlorine, and bromine are exposed di-

rectly to the above-named salts, and even to the metallic silver itself, at the moment when the solar action makes its influence felt. These re-actions, which are sufficiently complex, become more so by the iodides, chlorides, and bromides of silver being submitted to the action of rays which always act with the same energy in the violet part of the spectrum; whilst in the red portion the rays re-act with greater energy, owing to certain chemical actions having commenced.

It is therefore essential to distinguish between the chemical re-actions effected under the influence of light upon sensitive substances alone, and upon combinations of them. This has not been done by Messrs. Foucault and Fizeau: they have considered a Daguerreotype plate as offering a *separate sensitive surface*, whilst it is only by a mixture of substances that different effects can be produced in the various parts of the spectrum, as is proved by Mr. Herschel's experiment, and without the existence of rays acting in an inverse direction. Thus, it has been proved by experiment, that the solar rays, although of various degrees of refrangibility, only act in one way upon iodide of silver; whilst a mixture of this substance with other matters may occasion several chemical re-actions acting conjointly, and hiding the principal effect.

If the light acts only in one way upon iodide of silver (the continuous rays included), the case may be different on other sensitive substances, and the rays may act sometimes positively and sometimes negatively. It is known, in fact, that each sensitive substance is differently affected by the solar rays; this might be explained by stating that each sensitive substance receives the rays in a manner peculiar to itself. I will cite as an example, an observation of Wollaston's, with regard to the sensitive substance *guaiacum*, which becomes blue beyond the violet part of the spectrum, and again becomes colorless in the red and yellow rays.

I have confined myself to the foregoing observations, on the subject of Messrs. Foucault and Fizeau's note, to shew that the complicated phenomena produced by the appearance of the Daguerreotype plates (although very important for the photographic images produced in the camera-obscura, and for the observation of active rays of very little intensity) cannot lead to definite and unvarying results, as regards the nature of the chemical action produced. It is therefore necessary to operate, as has been heretofore done, by means of simple products, with sensitive paper; regard being had to the electrical effect due to the chemical re-action produced under the influence of the solar rays.—*Idem.*

From the foreign journals we gather that King Louis Philippe has created M. Le Verrier an officer of the Royal Order of the Legion of Honour, in acknowledgment of his late scientific researches. His Majesty, thinking it would not be just to separate two names which in the minds of philosophers will ever be united, has also been pleased to nominate M. Galle of Berlin (the fortunate astronomer who verified M. Le Verrier's prediction of the far-distant planet) Chevalier of the same distinguished Order. It now remains to be seen in what way the genius of our own countryman, Adams, will be acknowledged, and his indefatigable researches recompensed, here. However we may regret that the honor of this discovery, which perhaps exhibited one of the sublimest efforts of the human mind, should, by a series of fortuitous incidents, have been lost to this country, it is some satisfaction to find that there was one intellect amongst us capable of conceiving the *want* of another planet for the perfecting of our System, and able also to determine its existence. Another circumstance worthy of remark, inasmuch as it shews the peculiarity of the present age, is the absence of anything approaching to ill-feeling or jealousy in the minds of the professors concerned, either directly or indirectly, in the promulgation of the discovery; for no one who has read the Memoir drawn up by Professor Airy for the Royal Astronomical Society, can fail of being struck with the interest taken in Mr. Adams' communication, and the readiness exhibited in affording him the assistance he required while pursuing his researches. For bodily toil, ease is a suitable reward, but the greatest offering to genius is merely homage; when therefore a lofty intellect is left unnoticed, it is a proof of our immeasurable inferiority. Let us not, therefore, as a nation, lay ourselves under this humiliating ban; but copy France, in paying honor where honor is due.

THE HIGH-PRESSURE STEAM-ENGINE

INVESTIGATED.

From the German of Dr. Ernst Alban, with Notes by William Pole, F.R.A.S. Parts I. and II.—John Weale, High Holborn, 1847.

That English engineers should be referred to foreign experience and investigation for an exposition of the construction and comparative merits of any particular modification of the steam-engine, or in fact anything relating thereto, will doubtless excite sur-

prise, and require a little explanation. The translator of the above work has, therefore, in a somewhat apologetical manner introduced his author to the notice of the English reader. He says, and says truly, that while the low-pressure or condensing engine has received an extraordinary amount of attention and patient investigation, the construction of high-pressure engines has, until within a few years, been comparatively neglected; owing to the supposed increase of danger and want of economy to which they are liable. Although we possess most elaborate and valuable works as text books for the condensing engine, in all its variations and applications, we are not aware of any really standard work to which the engineer or manufacturer may with confidence refer for information upon the nature, construction, and comparative merits of high-pressure engines.

As far as the present issue, comprising Parts 1, and 2, (the whole to be completed in four parts,) will enable us to judge, the author seems to be perfectly acquainted with his subject; and fully able to combat any objections that might be made against his views, as to the superior economy and safety of high-pressure engines over the condensing or low-pressure engine.

A work of this nature is only valuable when based upon sound principles, the result of numerous careful experiments; admitting therefore, in the first instance, the ability of Dr. Alban, to carry out such trials (and this we may safely do on the authority of the translator), we have just such a Treatise as may be desired; for, in his introductory chapter, the author says, "The principal object of this, my work, will be to make known a series of experiments and observations undertaken by me, partly on engines which I have constructed for various establishments, partly on two which have been working under my own eyes; to specify the researches that have occupied me uninterruptedly for a long term of years with their unsuccessful as well as their successful results; and to exhibit the train of ideas, in reference to the improvement of the machine, which I have deduced from the whole. My objects have been, in the first place, to lessen, or rather entirely to remove, the dangers supposed to attend the use of high-pressure steam; and, secondly, to discover a plan of construction on the simplest possible principles, which should always correspond with and be adapted to the work to be done by the engine." The author has evidently had very extensive practical experience in the mode of constructing and working this description of steam-engine, under different circumstances; having, he says, "scarcely ever made engines similar to each other, but all for different purposes;" he further says, "I have had a manifold variety of circumstances to deal with, and not unfrequently difficulties to overcome, which have led me out of the accustomed track; but I have ever found myself able to attain the most desirable results by the most simple means."

The first division of this work treats of the high-pressure engine

generally. The author commences by alluding to the want of experimental information on the subject, and the early neglect of the high-pressure engine. He then proceeds to examine and answer the principal objections brought against that construction of engine, dwelling more particularly on that which has proved the greatest obstacle to its more frequent employment, namely, its alleged danger; and having discussed the various causes which produce explosions of boilers, he adduces proof, both from reason and experience, that when proper precautions are taken, high-pressure boilers are not more liable to accidents than other boilers. After noticing a variety of objections, the peculiar advantages resulting from the use of engines constructed on the high-pressure principle, are enumerated at great length,—such as their simplicity, lightness, compactness, cheapness, &c., together with greater economy of fuel in the generation and application of steam.

The second division treats of the boiler and furnace, and their appendages;—such as the feeding apparatus, safety-valves, pressure and water gauges, also the proving of boilers, and the construction of certain improved boilers invented by the author; concluding with a detailed description of the construction and general arrangement of the various parts of boilers for small engines, and the precautions to be taken under various circumstances.

The author attributes the comparative neglect of the high-pressure engine in a great measure to the prejudices and obstinacy of English engineers, and occasionally throughout the work indulges in some severe animadversions upon their apparent determination to abandon the use of this construction of engine under all circumstances, except where the employment of condensing engines is manifestly impracticable,—rather than take the trouble to investigate the causes of its alleged danger and want of economy, and endeavour to remove or mitigate them. There may be some truth in these observations, in reference to bygone years, but latterly, owing to the extension of railways, the high-pressure engine (which is the only construction of engine practically applicable to locomotive purposes) has received an unwonted share of attention from the most talented and experienced engineers in the United Kingdom, and therefore it has, as might have been expected, been considerably improved. As Dr. Alban's treatise appears at a time when the attention of engineers generally must, of necessity, be directed to the construction and improvement of the high-pressure engine, it will no doubt be well-received, and form a useful guide to many who have not investigated the subject so deeply as the author appears to have done.

With respect to the translator's labours, we may state that he has improved upon the author's division of the subject, by most judiciously subdividing the entire work into sections which are numbered; and a synoptical table of contents having been added, any particular part of the subject may be referred to with

the utmost facility—as the table of contents presents at one view a general idea of the subject-matter of the treatise.

The work is illustrated with plates by Gladwin, and the absence of all unnecessary algebraical or mathematical calculations, will not, it is presumed, render it less acceptable to practical men, to whom we can with confidence recommend it, as containing a large amount of valuable information, deduced from actual experiments conducted in a careful, scientific, and impartial manner.

ON EXPERIMENTS MADE UP TO THE 4TH NOV., 1846, AT THE POWDER AND SALTPETRE WORKS, PARIS, ON THE MANNER OF PREPARING GUN-COTTON, AND ON ITS PROPERTIES AND POWERS.

In all the experiments made hitherto, the cotton (first uncarded and next carded) has been prepared by steeping it in a mixture of equal parts of concentrated azotic acid and good sulphuric acid, and afterwards washing it well with water. M. Susane, Captain of Artillery, Aide-de-camp to Lieutenant-General Baron Neigre, Director of the Powder Works, and M. de Mezieres, Commissary of the Saltpetre Refinery of Paris, conducted these experiments.

50 grammes of cotton were first prepared according to the above-stated process; the duration of the operation, the quantity, and state of the acids being varied.

The experiments were commenced on Tuesday, the 3rd November, the charges and manner of charging being also varied. Five samples of cotton, of 10 grammes each, were prepared.

First sample.—The immersion of this sample in the acids lasted two minutes; it was afterwards well washed in water.

Second sample.—The first preparation having shewn that contact with the air must be carefully avoided, a larger quantity of acid was used, and the cotton when completely immersed therein was secured from the air by the vessel being hermetically sealed. At the end of ten minutes the cotton was taken out well prepared.

Third sample.—The cotton was only steeped five minutes, but as some parts projected above the level of the acids, it was found necessary to steep it in the same manner as the preceding, In order to avoid this in future preparations, the cotton was loaded with several glass discs.

Fourth sample.—As it was desirable to ascertain whether the acid mixture, in which cotton had been steeped, possessed sufficient energy to charge a second sample, on adding a fresh quantity of the mixture, the cotton was immersed during fifteen minutes: it appeared well charged, and was divided into two nearly equal parts; the first was washed and dried, and the second, having been washed in pure water, was steeped in a saturated solution of saltpetre, and afterwards dried.

Fifth sample.—This was steeped for an hour in the acid mixture of the preceding preparation, without adding any thing thereto.

Six specimens, varying in the time of immersion from two minutes up to an hour, were thus obtained; the three first prepared with fresh acids, the fourth with a mixture which had served once; the fifth with a mixture which had served twice. A portion of the fourth was washed in a solution of saltpetre. These different samples were designated by the numbers 1, 2, 3, 4, 4*, and 5.

The sample No. 1, was used in quantities of 1, 2, 3, and 4 grammes, and produced the following results:—

	Metres.*
Charge of 1 gramme	120,161 velocity.
— 2	223,186 —
— 3	178,372 —
— 4	433,206 —

The result of the third experiment, with a charge of 3 grammes, presents an anomaly, arising from the fact, that in loading, the charges must be kept at a height proportioned to the quantity of cotton. This had been previously fixed at 24 millimetres for every gramme; but the third charge had been reduced to 37 millimetres in height, and the cotton was too much heaped up. It was then settled that the height of the charges should be 24 millimetres for every gramme.

The detonation is very powerful; much more so than that produced by an equal quantity of gunpowder, but the report is of another nature and less trying to the ears: it is a very sharp sound.

All the cotton burned away in the piece, whatever was the magnitude of the charge; no trace of smoke being left. Only a very short flame was perceptible at the mouth of the piece, and the impression made by the ball was at least as great as that produced by gunpowder, driving the ball at the same speed. There was a faint smell, like burnt feathers. The charge left no dirty residuum in the piece, but there was a large quantity of condensed steam, which rendered it necessary to wipe out the barrel each time; the linen used for this purpose was always somewhat soiled, either by a small quantity of carbon not burnt, or by chemical action upon the iron.

The sample No. 2, gave the following results:—

	Metres
Charge of 1 gramme	180,961 velocity.
— 2	218,070 —
— 3	383,881 —
— 4	463,304 —

* A French metre is 39 inches.

The charge of 2 grammes had inadvertently been left at a length of 55 millimetres instead of 48; from this cause the velocity was not so great as it ought to have been by about 60 metres.

In order to ascertain the influence of the cartouch-paper, the experiment with 2 grammes was repeated with a cartouch cut to the length of 48 millimetres;—the velocity was 331,964 metres, which is a very remarkable result. The greater part of the paper remained in the piece without being burnt, which is a serious evil; to be remedied perhaps only by using paper prepared in the same manner as the cotton, for making the cartridges.

The sample No. 3, was fired in the form of cartridges of the required length, viz., 24 millimetres per gramme; and moreover the piece was not cleaned after each discharge, in order to ascertain the effect of the steam condensed in the piece. The speed in this case was diminished, and the cotton was a long time taking fire, and at length, at the fourth discharge, the greater part of the cotton was thrown out without being ignited; and this cotton was so damp that it would not take fire in the open air. The piece was then cleansed, and the result of the next discharge was very satisfactory. The results were as follows:—

	Metres.
Charge of 1 gramme, without paper......	115,247
— 1 gramme, with cartridge	126,611
— 2	294,901
— 3	156,764
— 4	418,338

The other samples were fired without cartridges.

The result of No. 4, was as follows:—

Charge of 1 gramme..................	124,487
— 2	326,879
— 3	404,775
— 3	402,761

As there was not sufficient cotton for another charge of 4 grammes, two charges of 3 grammes each were fired; and the similarity between the two is very remarkable.

The sample No. 4*, prepared with saltpetre, furnished the following result:—

Charge of 1 gramme..................	194,366
— 2	306,879
— 3	399,254

It was thought, that as this cotton was heavier than the preceding, the charges would have been a little shorter.

Lastly, the sample No. 5, was tried, in charges extending up to 5 grammes, and gave the following results:—

	Metres.	Differences in round numbers.	
Charge of 1 gramme	151,465		
— 2	315,494	160	
— 3	411,073	100	60
— 4	477,086	60	40
— 5	518,393	40	20

The effect of the last discharge is very remarkable, for, independently of the propelling force being very great, it increases in regular progression for every additional gramme. This regularity is, no doubt, one of the characteristics of this substance, as it is the result of chemical transformation. It could not exist in the same degree in ordinary gunpowder, which is only a mixture, more or less perfect, of three substances mechanically united.

Considering the difficulties attendant on a first trial with a substance, the nature of which has not yet been fully ascertained, and also the impossibility of regulating at first the mode of charging, it will be seen that the foregoing experiments are well worthy of attention.

On comparing the results furnished by five different charges of cotton with some experiments made last winter by M. Mallet, officer of artillery, upon the velocity produced by common gunpowder, the following were the results:—

	Gunpowder Metres.	Cotton Metres.
Charges of 1 gramme	94,268	149,342
— 2	169,897	280,433
— 3	234,091	400,349
— 4	284,956	447,732
— 5	320,153	518,393
— 6	360,122	
— 7	396,161	
— 8	414,085	
— 9	441,570	
— 10	465,288	
— 11	488,437	
— 12	499,208	
— 13	514,425	
— 14	531,817	
— 15	559,851	

From this table it will be seen, that on taking the average of the results furnished by the six samples, manufactured at the powder works, under unfavorable circumstances, 5 grammes of gun-cotton produced the same effect as 13 or 14 grammes of common gunpowder.

In conclusion, as regards the manufacture of gun-cotton, it is necessary, in order to obtain a good product, to observe the following conditions:—

1st. To steep clean cotton in a compound of equal parts of azotic acid and sulphuric acid.

2nd. Although the time of immersion appears to be of little importance, yet those samples which were immersed from 10 to 15 minutes, gave the best results.

3rd. An acid compound may be used twice, if necessary, on revivifying it: Nos. 4, 4*, and 5, were prepared in this manner.

4th. The cotton, when immersed, must be completely covered by the liquid.

5th. The cotton must be dried slowly, and must not, especially while damp, be exposed to a higher temperature than 100° cent.

6th. Its energy is somewhat increased by washing it in a saturated solution of saltpetre, but it does not appear that this is worth the additional expense.

Gun-cotton possesses in practice some advantages, and some disadvantages. The advantages are cleanliness, quick combustion, absence of a solid residuum and bad smell, lightness, possibility of handling without danger, freedom from dust or comminution, and consequently waste; and a power which may be computed at three times that of gunpowder. The disadvantages are, its bulk and consequent difficulty of stowage and carriage; and the production in the gun of a large quantity of steam, which is perhaps more troublesome than the dirt from gunpowder.

With regard to the cost and the effect of this substance upon fire-arms, these are questions requiring consideration.

It is very certain that a new and superior power has been discovered, and the only question is, how it may be advantageously employed? There is very little doubt that this will ultimately be arrived at; and also that some of the disadvantages which now exist will be obviated. It is also to be presumed, that when the subject is better understood, the price of a substance requiring so little trouble for its preparation will not offer any obstacle to its use.

The experiments are still in active progress at the powder works.

* * * * *

M. Arago announced at the same meeting, that he had received a letter from M. Schönbein on the subject of gun-cotton, but he did not think himself justified in communicating the contents, as the writer seemed determined not to disclose his process.

Society of Arts.

CORDES AND LOCKE'S ROTARY ENGINE.

THE first ordinary meeting of the Society of Arts since the Christmas recess, took place on Wednesday, the 13th of January, when a paper on Messrs. Cordes and Locke's new rotary engine was read to the meeting. The subject was illustrated by several working drawings of the engine, as employed for pumping water and actuating screw-propellers. A beautifully-made but rather minute working model in brass of a marine engine, constructed on the improved principle, was also exhibited. The internal construction or arrangement of the engine, as well as the mode adopted by the patentees to test and ascertain its power, were explained by Mr. Cordes, and rendered clear by several models, which were handed round to the members. As some account of the construction of the engine was given in a recent number * it will be sufficient to state, that the engine consists of a nicely-balanced wheel, mounted in well-packed bearings, and revolving freely in an air-tight case, from which the air is exhausted when the engine is in operation. The wheel therefore revolves in vacuo, and is furnished at its periphery with vanes or fans, and both sides of these vanes are closed by what the inventors call "a shrouding," whereby a series of buckets are formed round the circumference, as in the case of an overshot water-wheel. Between the sides of the buckets and the air-tight case there is from one to two inches space, and when steam at a low pressure is let into the case, it strikes against the centre part of the fans, and drives the wheel round with great velocity. The power exerted by the engine was said to depend upon the state of the vacuum in the case, and therefore, in marine engines, where it is of importance to be able to start the engine at a moment's notice, a small auxiliary engine was proposed to be employed, to produce and keep up a vacuum in the case; it did not, however, appear that this was necessary for stationary or land purposes, as the rotary engine itself would, in a few minutes, by the adaptation of suitable gearing to work the pumps, exhaust the case and keep up the vacuum while in operation. The results of a variety of experiments for testing the powers of the engine were also given, which led on a discussion, wherein many theoretical objections were made by members, and replied to by Mr. Cordes and others.

One important advantage incidental to this engine appeared to be, that by placing one of the improved rotary engines between the cylinder and condenser of an ordinary low-pressure or condensing engine, and allowing the steam from the cylinder to pass through the case, and act upon the wheel contained therein, be-

* See page 352, Vol. XXIX.

fore passing into the condenser, an additional power, amounting to one-third of the power given off from the condensing engine, was obtained. In other words, if a rotary engine were placed between the cylinder and condenser of a thirty-horse low-pressure engine, an additional power of ten horses would be obtained from the steam which is usually allowed to pass unprofitably into the condenser. This point seemed to be much questioned by engineers present, but Mr. Cordes stated that, at his works at Newport, Monmouthshire, two separate and distinct loads had been driven by two engines so arranged, and, when combined in this manner, the condensing engine was found to operate rather better than when working alone; which circumstance he accounted for by supposing that the steam found a more ready exit from the cylinder when allowed to rush into a large space like the case of the rotary engine, than when merely allowed to pass into an ordinary condenser. The thanks of the society were then given to Mr. Cordes for his communication.

January 20th.

MRS. WHITBY ON THE CULTURE OF SILK IN ENGLAND.

It appeared from the paper read by the Secretary that Mrs. Whitby had devoted considerable attention to the cultivation of the mulberry and growth of the silkworm in this country, and had succeeded in producing an article of an equal if not superior quality to foreign silk; and, from an experience of some years in the culture of the mulberry and rearing of silkworms, it was her opinion that silk might be produced of as good a quality, and at as cheap a rate, in this country, as it could be obtained from abroad. Such being the case, it was desirable to make silk a staple article, and to encourage its extensive cultivation by the rural population of the southern counties of England and Ireland. An animated discussion then took place between some gentlemen who were interested in, or conversant with, the subject; and considerable varriety of opinion appeared to exist as to whether the culture on a large scale, could be carried on with the same advantage in the United Kingdom as abroad; owing to the higher price of labour here, in comparison to most foreign countries.

The thanks of the Society having been voted to Mrs. Whitby for her interesting communication, a paper on a subject no less important was then read by the Secretary. It was a communication by Mr. Taylor, on a new oil plant called the *Camelina Sativa*, or "Gold of Pleasure," and its importance to agriculturists and manufacturers generally; with remarks on the opportunity now afforded of introducing its cultivation into Ireland. The *Camelina Sativa* is an oleiferous plant, from the seeds of which a fine vegetable oil, suitable for burning in lamps and for other purposes,

may be expressed. Mr. Taylor stated that the plant was hardy, being a native of the most northern parts of Siberia, and would therefore grow and flourish in most parts of England and Ireland. The soil most suitable for the plant is that of a light sandy nature; it does not require manure, and will grow well on poor lands; it should be drilled in rows at about nine inches apart, and be well covered over with earth; but should not be too deeply planted, as otherwise it will not germinate. The plant bears a small yellow flower, and as its foliage is not very dense, clover may be planted between the rows. The seed, if sown in March, will be ready to reap in July. When ripe, the plant may be cut down with a scythe or sickle; and it should be left on the ground and turned over occasionally for a day or two, previous to stacking. After the plant is removed from the ground, if nothing else has been sown with it, turnips may be immediately sown, as the "Gold of Pleasure" does not impoverish the earth like many other crops. About ten pounds of seed will be required for one statute acre; and the market value of the produce averages about £8 or £10 per acre. When the oil has been expressed from the seed, the oil-cake will be found very useful for feeding cattle. Specimens of the seed and oil were exhibited to the meeting; the oil appears clear, limpid, and well adapted for burning in lamps. Mr. Taylor considered that the introduction of this plant into Ireland would be extremely beneficial to the agricultural interests, as it is peculiarly adapted to the soil; he therefore offered to supply any amount of seed, if the produce was guaranteed to him at a fixed price.

January 27th.

The first communication read this evening was on "Architectural Carving, by Irving's Patent Machinery." The paper pointed out the utility and importance of any invention whereby ornamental carving could, by reducing its cost and labour of production, be rendered more generally available for decorating churches and baronial residences: it did not, however, give any particular description of Mr. Irving's patent machinery,* the general construction of which was explained by the Secretary, who had seen it in operation. It was stated, that what would require months and years to produce by manual labour, could, by the aid of this machine, be produced in days and weeks, in a much better manner. Some beautiful specimens of carving in both wood and stone were exhibited, and also some specimens of inlaid marble, produced by the aid of the machine.

The next communication was by H. Cole, Esq., "On the formation of a National Gallery of the works of British Artists, by means of public voluntary Contributions."

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* For specification of this patent, see Vol. XXVI., p. 221, Conjoined Series.

For the following condensed report of this paper, we are indebted to the *Daily News.*

"The wish to establish a National Gallery of British Art has found utterance oftentimes, and in many ways, but hitherto no practical steps have been taken to realize it. We have painters quite worthy to rank with those great mediæval artists whose works we have scantily collected in our National Gallery; but we have no public collection of our own painters' works. If it be necessary to mention names to support this position, I need select three artists only out of many who might be named, and each one honorably representing a part of the United Kingdom—Wilkie, Scotland; Mulready, Ireland; and Edwin Landseer, England. We may instance with pride these artists, as having shewn in their works a peculiar and original genius, which certainly no ancient master has surpassed, or, perhaps, equalled. France and Germany have been honoring their artists and benefiting their people, by placing before them the works of their painters; but England has hitherto done nothing publicly. Towards the formation of a British National Gallery, we have only at present the prospective effects of Sir Francis Chantry's noble bequest. This, as the Society probably knows, is the gift of many thousands of pounds, to be applied in procuring the best works of British artists, to be given to the nation, under the proviso that the Government do contribute a suitable building to hold them. Considering the special contingencies attending this bequest, we may hope it will not be long before Sir Francis Chantry's generosity can take effect. In the meantime, with the public support, it is proposed that this Society shall endeavour to do what the Government might have done, and take the first step towards the formation of a gallery of the works of eminent British artists.

"This proposal, of which I will now proceed to speak in detail, has been thus far sanctioned according to the laws of our Society. Submitted in the first instance to the Fine Arts Committee, it was referred by them to the Council, who, I am happy to say, after due consideration, resolved that it was a worthy thing for the Society to undertake.

"It may not be generally known that the first public exhibition of pictures was held in the rooms of this very Society of Arts. The artists whose works were exhibited, soon afterwards formed the Royal Academy. To this extent, at least, we may claim this Society as the parent of that lusty offspring: and it is opportune to be reminded that the Society of Arts was the first to establish an exhibition of pictures, when it is proposed that it shall revive the custom. As the Society took this foremost position when British art made its first steps in the establishment of an academy, so it is a fitting sequence that the Society should now proffer its aid and become the first agent to gather together, as in a treasury, the fruits of that academy in its years of maturity. With these views, I have suggested that the Society shall organize an annual exhibition of pictures, entirely novel in its kind, and differing essentially from any other existing exhibition of pictures; to be, in fact, an exhibition which will be auxiliary to all others, and not the rival of any one of them. It is proposed to collect once a year (the month of June is suggested), and exhibit in this great room as many as possible of the paintings of some one eminent living artist, and to couple with the collections of pictures an exhibition of all the engravings from them.

"There would be great interest in thus bringing together, in a chronological series, the works of the best artists of our own school—of exhibiting year after year the productions of such men as Eastlake, Leslie, Edwin Landseer, Maclise, Collins, Mulready, and Turner too, recollecting his "Carthage," and "Mercury," and "Herse;" and when we have exhibited the works of these men, and others that might be named, and thereby bestowed on the nation gifts of their genius, and honored the men themselves, our younger artists, rising into equal fame, will supply our walls with fresh attractions. There are many advantages in exhibiting the works of an artist during his life-time, rather than after his death. Obviously the col-

lection of them may be made all the more complete. The works exhibited are thus stamped with the artist's own guarantee for their genuineness.

"When we consider the public interest which often attaches to the exhibition even of a single fine work of one artist, it may be confidently hoped that the public would encourage warmly the exhibition of numbers of fine paintings of one artist; having the motives to do so, first for its own direct and immediate gratification in the exhibition itself, and next the object of procuring by means of it a work of high art to become its own property. The principal object, then, of this exhibition is to amass a fund, for the purpose of forming the *nucleus* of a gallery of the best works of British artists; to be thus enabled to give to the artist whose works are exhibited, a commission for a picture without dictation as to subject or size; to give him a commission in such a mode and in such terms as shall be calculated to obtain from him a picture which he would feel a pride in shewing to his countrymen as his best work; on which he would rest his fame, and which he would offer to posterity as the best specimen of his genius and ability. An incidental advantage in this course, will be, that we shall be thus enabled to test whether works of art cannot be procured better by giving direct commissions to artists who have established their fame, than by an open competition which addresses itself to everybody and nobody in particular. When this picture is painted, it is proposed to present it to the National Gallery, assuming that the building is capable of receiving such a collection. In any case the pictures will become the property of the nation. In proportion as the public support the exhibition, so will they get a return for their support. We may hope that funds will be forthcoming, sufficiently ample, not only to pay the handsomest price for the new picture, but to enable other works already of established fame to be purchased. It is proposed that the charges for admission should be on a graduated scale, so as to enable all classes to become voluntary contributors, and thus share the merit of founding a National Gallery of British Artists. But in order to give an opportunity to those parties who may be willing to promote this object more directly, it is proposed to receive special subscriptions of £1 and upwards per annum. The name of each subscriber will be registered as one of the donors of the picture; they will receive an original etching of the picture painted for that particular year, and a free admission to the annual exhibition. In maturing this plan it was necessary to ascertain the feeling with which the fortunate possessors of pictures were likely to entertain it, and how far they would be disposed to assist the scheme by the loan of their pictures. As might have been expected, the proposition has been received with the greatest good will, and there can be no doubt that the proprietors of pictures will liberally aid the plan. Already promises of assistance have been given which place the possibility of making an attractive collection beyond a doubt. In conclusion, the meeting will perhaps like to know the name of the artist whose works it is proposed to exhibit at the opening of this new campaign. It is that of an artist who, on all hands, is admitted to be unrivalled in his particular walk of art, either among ancient or modern painters in this or any country—whose genius has a development especially English, and whose deserved fame is recognised by all classes of his countrymen:—the meeting hardly need to be told that that artist is—Edwin Landseer.

At the conclusion of the paper, many valuable suggestions on the subject were made by several members present, and the further consideration of the communication was referred to the Committee of Fine Arts.

A communication was then read on a pneumatic inspirator, for the use of dry-grinders, divers, firemen, and others, by Mr. Startin. The plan proposed by the inventor for preventing the admission of noxious vapours and extraneous matters into the lungs, is by the employment of an apparatus consisting of a me-

tal box, furnished with peculiarly-constructed valves, one opening inwards for inspiration, and the other outwards for expiration.—Air for inspiration is conveyed to the wearer through a flexible pipe, communicating with an adjoining room or other place, where the air is comparatively pure; but the expired air passes out into the surrounding atmosphere. The valves are made of thin laminæ of vulcanized India-rubber, placed over apertures through which the air passes with facility in the act of breathing. It was stated, that the apparatus was peculiarly adapted for inhaling medicated vapours, as also for the use of divers; but the applicability of the instrument, in its present form, to the latter purpose, was questioned by some gentleman present.

REPORT OF AMERICAN PATENTS.

From the "Journal of the Franklin Institute."

BY MR. C. M. KELLER.

To DANIEL HARRINGTON, *of Philadelphia, Pennsylvania, for an improvement in the graduating pen-holder.*

CLAIM:—"I am aware that slides have been applied to pen and pencil-holders, for various purposes, as also projections to receive the ends of the writer's fingers, to protect them from the ink; and therefore I do not claim simply the application of spring-slides or projections for the reception and protection of the fingers, as of my invention; but what I do claim therein as new, and desire to secure by letters patent, is the combining therewith a projecting piece, ring, or guard, which shall extend out from the holder sufficiently far to act as a guard in preventing the pen from passing too deep into the ink-holder, such ring or guard being attached to a spring sliding within the body of the pen-holder, to afford the ready means of strengthening the spring, and for adjustment, substantially in the manner herein described.

"It will be seen that, although the sliding part of the pen-holder bears some resemblance to the slide of a pencil-case, and of some other instruments, its object and arrangement differ entirely from those of such slides, in its constituting a projecting guard, intended for a new and definite purpose."

To HENRY A. ROE, *of Erie, Pennsylvania, for improvements in the machine for folding sheet-metal.*

THE patentee says:—"The nature of my invention consists, first, in attaching what I term the folding-plate, that is to say, a plate which gripes the edge of the sheet of metal, and on which the folding is effected by the folder, to a bed placed below it, and hinged to the bed of the machine, so that the sheet of metal can be folded entirely over, instead of griping the sheet by a square

jaw extending above and forming a stock above the plane of the bed of the machine, as heretofore, which prevents the sheet from being folded entirely over, and therefore requiring a secondary operation to complete the folds.

"Secondly,—In supporting the said folding-bed, to which the folding-plate is attached, in the middle of its length by a joint-bolt, the head of which lies in a semi-circular recess in the folding-bed, and as near as practicable in a line with the axis of motion, and secured in the bed of the machine.

"And Thirdly,—In the employment of a side-plate below the folding-bed and back of its journals, provided with inclined planes, on which projections from the back of the folding-bed rest, so that by the working of the slide-plate by a lever at the end of the machine, the folding-plate can be made to gripe and liberate the sheet of metal."

Claim:—"I do not claim, as my invention, simply griping the sheet of metal between the face of a stock and the bed, as this has heretofore been done; but claim as my invention, first, making the folding-plate to project from and on top of the stocks to which it is attached, or of which it makes part, arranged in combination with the bed of the machine and the folder, in the manner herein described, by means of which the edge of the sheet-metal is griped and folded entirely over, substantially as herein described; and I also claim, in combination with this arrangement, the manner of preventing the folding bed and folding-plate from springing in the middle of the length, by means of the bolt, with its imbedded journal-head, substantially as herein described."

To Daniel Harrington, *of Philadelphia, Pennsylvania, for an improvement in the galvanic electric machine.*

This instrument is for "conveying galvanic electricity (for the cure or alleviation of diseases) into the human system through the different cavities thereof, particularly through the rectum and vagina—and also by the same instrumental process, a new and improved mode of accompanying the galvanic influence by life-giving action in the way of alternate distension and contraction of the parts in quick succession."

Claim:—"The improvements in this new instrument, are the method of combining the pieces of copper and zinc into an instrument, the said pieces being insulated from each other, and having liberty to rock, so as to touch together, by being moved to the right or left, and thereby produce a galvanic shock: while they are so affected they produce mechanical action, by which a much greater number of shocks are experienced in a given time than the ordinary instrument, in any of its forms, can be made to do, and thereby furnishing a large *increase* of curative or medicinal power. The above-named improvements, it will be seen, are three-fold. There is also one other improvement em-

braced in this instrument, important to such invalids as are feeble in the strength of their fingers, a complaint usual with emaciated females; the shocks produced by moving the turned-up end to the right or left can be accomplished with the least possible exertion of the hand, or thumb and finger.

"It is my intention to vary the construction of the newly-improved galvanic electric instrument, so as to adapt it to the requisitions of the various cavities of the human system, and the wants of invalids of all descriptions, still preserving and embracing its general principles, features, and improvements, as above described and claimed."

To PHINEAS BENNET, *of New York City, New York, for improvements in the method of raising or saving the cargoes of wrecked vessels.*

THE following claim will be found to give a clear notion of the principles of these improvements.

Claim:—"I do not claim, as my invention, the employment of a steam or other boat for assisting in saving or partially saving wrecks or other cargoes, as this has before been done; but what I do claim as my invention, and desire to secure by letters patent, is the employment of a caisson, made of water-proof cloth, or other suitable material, rendered water-proof, or partly so, to enclose a wrecked vessel, for the purpose of excluding the surrounding water whilst pumping from the inside of the wreck and caisson, as herein described.

"I also claim, as my invention, the employment of the moveable frame or platform, in combination with the flexible caisson and wreck, for the purpose and in the manner described; and, finally, I claim connecting a pump or pumps with the caisson, and a steam-engine or other first mover on board a boat, by means of the swinging crane, in combination with the universal joints, as herein described, to admit of the free movement of the boat or caisson, without affecting the connexions, as herein described."

To JAMES MONTGOMERY, *of Memphis, Tennessee, for an improvement in the method of preventing the explosion of steam-boilers, and saving fuel.*

CLAIM:—"Having described the nature of my improvements, in the manner of employing expanding bars or rods, for preventing explosions and economizing fuel, what I claim as new therein is the combining with a steam-boiler of two such bars of brass or other suitable metal, arranged as herein described; the said bars being also combined with each other, and with the apparatus by which the damper in the chimney is to be closed, and the draught through the furnace arrested, the same being effected substantially in the manner herein set forth. I do not intend, however,

by this claim, to limit myself to the precise arrangement of the respective parts of my apparatus, as herein described, but to vary them as I may think proper, whilst I attain the same end by means substantially the same.

"I do not claim the exclusive right to use expansion-rods or bars to open or close valves or dampers, by variations of temperature, this principle for obtaining motion for such a purpose being well known; but I limit my claim to the foregoing improved arrangement and combination of parts for effecting this object."

Two brass rods are used and inserted in iron tubes, one placed near the bottom of the boiler, and the other at the side, and just above the top of the flues, the tubes being attached at each end to the heads of the boiler, so that the rods can pass out through the heads. The lower rod is attached to the tube at the forward head, and at the other end is jointed to a lever, the other end of which is jointed to the other rod, the fulcrum being between the two rods—and the other end of the upper rod, which moves by the expansion of the two, is connected with the damper by a piston, or other means.

Scientific Adjudication.

Before the Master of the Rolls,—January 16th, 1847.

FISHER *v.* OLIVER AND ATKINS.

THIS was an application to restrain the defendants from infringing a patent granted to William Crofts, for certain improvements in the machinery used for the manufacture of lace or net, called bobbin net, of which patent the plaintiff Fisher was proprietor. In November, 1838, Crofts invented further improvements for the manufacture of lace, and a patent was then obtained for them. The specification described in substance the invention to be, amongst other things, for the manufacture of ornamental lace having opaque cloth-work produced therein, in varied patterns according to the taste of the designers, in bobbin net machines, by working with additional warp-threads. Of this patent also, the plaintiff Fisher became proprietor. Infringements were made, by lace-makers at Nottingham, on the plaintiff's patent, and in 1840, 1841, and 1842, legal proceedings were commenced against divers parties, which resulted in compensation being made to the plaintiff. In 1843, a bill was filed in Chancery against the present defendants, who were fancy lace and edging manufacturers at Nottingham, to restrain them from infringing the patent, and the defendants, having acknowledged the infringement, compromised the suit by paying the plaintiff £300 for costs and damages; and they

undertook not to repeat the infringement. In 1846, the plaintiff discovered that the defendants were again infringing his patent; he therefore filed this bill in October last, to restrain them, and now moved for an injunction. From the statement of the plaintiff's counsel, it appeared that the patent was very valuable, and that there was a general combination amongst the members of the lace-trade to defeat it, and that the present suit was defended by a subscription amongst them. The motion was resisted on the grounds that there was no novelty in the invention—that there was no infringement—and that if there were, the plaintiff had acquiesced in it. For the plaintiff it was urged that the Court ought to grant an injunction at once, without first putting the plaintiff to establish his rights at law; having regard to the previous acknowledgment of the patent by the defendants. For the plaintiff, Messrs. Turner, Montague Smith, and Daniell, appeared; and Messrs. Kindersley, Glasse, and Webster, for the defendants.

The Master of the Rolls said he would consider what course he ought to take, but he certainly should not grant an injunction without an undertaking by the plaintiffs to try their right in an action at law. The question was, whether he should grant the injunction at once or refuse it, leaving the plaintiffs to bring their action, and compelling the defendants to keep an account in the meantime. He had no wish to interfere with the discretion of the plaintiff as to the mode of establishing his right at law, but the form of the pleadings ought not to embarrass the defendants in setting up any defence they might think proper. It was ultimately determined to refuse the injunction.

Before the Vice-Chancellor of England.—Jan. 18th, 1847.

STEVENS *v.* KEATING.

Mr. Bethell and Mr. Follett moved for an injunction to restrain the defendant from infringing a patent for the manufacture of cement, capable of receiving a polish, and being used in the formation of imitation marbles and various other building purposes. This invention, which is now the property of the plaintiff, was granted to Richard Freen Martin, October 8th, 1834, and in his Specification* he describes the production of certain hard cements by the use of gypsum, either in its natural state, or in its manufactured state of plaster of Paris, or limestone, or chalk, or lime, first reduced into powder and then mixed with a solution of any strong alkali, which is neutralized by means of an acid, added from time to time until effervescence ceases. The patentee prefers the use of American pearlash and sulphuric acid, but he

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* See Vol. XIV., C. S. of London Journal.

claims all such other alkalies and acids as would answer the purpose. When the mixture has obtained a proper consistence it is moulded into cakes, or bricks, or other required forms, which are afterwards submitted to a red heat in a furnace or retort, such as those used in gas works. The plaintiff subsequently became the proprietor of another patent, granted to the same R. F. Martin, June 2d, 1840, for "improvements in the manufacture of certain descriptions of cements," whereby he, in June, claimed the use of solid alkalies, and acids, or acids in a state of solid combination with other substances, as pyrites and mineral sulphate, for example, or sulphur by itself, or some solid compound containing both an acid and an alkali, as alum, or some mixture of two or more of the said similar ingredients. The defendant, it was said, obtained a patent in February, 1846, for the manufacture of cement like that invented by the plaintiff, and made precisely in the same way, but in his specification he claimed the combination of gypsum with borax. He therein stated that he was aware cements had been made from gypsum, or other calcareous substance, by combining these with acids, alkalies, and also with alum, and the same had been afterwards calcined; and he mentioned this in order to state that he had found the use of borax peculiarly applicable in the making of cement when combined with gypsum.

For the motion, it was contended that the use of borax, combined with gypsum, according to the defendant's specification, was an infringement of the plaintiff's patent, wherein he claimed the use, not only of all acids and alkalies, but also any substance in which the two were combined, and actually gave as an instance the substance called alum. It was also contended, that the plaintiff's patent, having existed for so long a period, must be considered good, and that he was therefore entitled to the injunction.

Mr. Stuart, Mr. Hibbert, and Mr. Webster, appeared for the defendant, and contended that the plaintiff's specification was too extensive; that the defendant, by discovering the use of borax, was able to make a much better cement than any which could be obtained from the use of alum, or any other substance coming within the description in the plaintiff's specification.

The Vice-Chancellor said it did not appear that there had been any dispute respecting the plaintiff's patent (which had been taken out many years ago) until last February. He was clearly of opinion that if the original patent were good, there had been an infringement of it by the defendant; but whether the defendant's patent was good as opposed to that of the plaintiff, was a question which must be decided by a court of law. His Honour thought that where a patent had been taken out so long ago, and dealt with up to the present time, it was not to be set aside after twelve years, merely because some objection might be raised to the validity of the language used in the plaintiff's specification. He considered there had been such a *primâ facie* establishment of

the plaintiff's right, that an injunction ought to be granted; but, at the same time, the plaintiff must be put upon terms to bring an action at law, to try the question as to the validity of the patent.

Before the Lord Chancellor,—January 23rd.

STEVENS *v.* KEATING.

This was an appeal motion to discharge an order of the Vice-Chancellor of England, granting an injunction to restrain the defendant from using a cement, in violation of the plaintiff's patent right, and directing the plaintiff to bring an action to establish that right at law. The plaintiff is the proprietor of a patent granted to the inventor, Mr. Martin, in 1834, for forming stuccoes, plasters, or cements; and in 1840, this patent was amended by an additional patent. The defendant obtained a patent for the manufacture of his cement in 1846. The specifications of the patents of both parties claimed for them respectively new modes of compounding alkali, acids, and gypsum, so as to make a cement which, when applied as a coating for pillars, would take a fine polish, and imitate marble in hardness, fineness, and durability. The plaintiff's cement was made out of the above ingredients separately, while the defendant professed to make his from a substance called borax, in which some of the same ingredients were found naturally combined. The cement made by the defendant was said to be in very general use, especially in the British Museum, the New Houses of Parliament, &c., and the plaintiff's cement was also much used, especially in some of the new club-houses in London, and public buildings in the country. Mr. J. Stuart and Mr. Webster, for the defendant, in support of the present motion, insisted that the specification of the plaintiff's patent was defective and inconsistent, and on that ground, if there were no other, the plaintiff was not entitled to an injunction for infringement of his alleged right. It was also urged that great, if not irreparable, mischief would be done, by stopping the various public works in which the defendant's cement was used, as the injunction was to stand until the plaintiff chose to bring his action, for which no time was limited. An injunction granted under these circumstances was opposed to the principles which his Lordship had, on many occasions, laid down in this court. The defendant in this case was willing to keep an account of the cement that should be disposed of until the plaintiff established by action, or failed to establish his right; and upon these terms, injurious to no party, the injunction ought to be dissolved. Mr. Bethell and Mr. Follett, in support of the Vice-Chancellor's order, contended that the plaintiff's specification was perfectly correct, and, even if not, a patent right which existed for twelve years ought not to be superseded upon the vague allegations of the defendant, whose own specification ap-

peared to have been copied from the plaintiff's. They also insisted that the plaintiff's cement was in very general use, and that he was prepared to establish his right by action immediately. Several cases were referred to on both sides, and the arguments occupied the greater part of the two previous days.

The Lord Chancellor, in giving judgment, said he had carefully read the specifications in question, in order to ascertain whether the defendant had objected to the plaintiff's right on the ground of a defective or erroneous specification of the patent only, or of non-infringement of the patent. He had also referred to the cases cited in the argument, and alleged to be authorities for giving a *primâ facie* right to long possession and enjoyment of a patent. In the course of the argument in this case, he discovered that an impression prevailed in the profession of his having expressed opinions in cases of injunction different from the established decisions of the court, as laid down by Lords Loughborough and Eldon. To see how far that impression was sustained, he had looked into the reports of some of his own decisions, as in "Collard *v.* Alison," and "Neilson *v.* Thomson," in neither of which, nor in any other case that he remembered, did he use any expression that could justly give countenance to the opinion that he differed from the long-established rules of the court in such cases,—certainly he never did intend to differ from them, nor to question their soundness. The opinion that he had at all questioned those long-established principles, arose probably from some expressions of his to the effect, that in cases of doubt of the right of a party applying for an injunction, the court ought to exercise great caution before granting the injunction, lest the party restrained might suffer an irreparable loss; while by refusing it, the party applying would sustain little or no injury. But where a clear infringement of a right was demonstrated, it would be absurd as well as unjust to tell the party to first establish his right at law. Long possession and enjoyment of a patent right came within that rule, and in such cases the court was not at liberty to exercise a discretion whether the patent was erroneous or defective. As regards the present case, his lordship had examined the specification of the patent of 1834, and he was of opinion that the right claimed was there set out in very distinct and intelligible terms. His lordship, after adverting to the ingredients that formed the composition of the cements, as stated in the different specifications, expressed his opinion that those of the defendant's specification did not substantially differ from the plaintiff's. The defendant had adopted different names for the materials of his cement, but borax, on which he relied as distinguishing his composition from the plaintiff's, was nothing but alkali and acid naturally existing in one body, which substances the plaintiff used, and described separately. If the defendant did, in fact, profess to make a cement of the same materials which the plaintiff used, though in a different combination, there could

hardly be a question of the plaintiff's right to the injunction. Indeed, the argument for the defendant did not proceed so much on his manufacture being new, as on the invalidity of the plaintiff's specification of his patent, and these circumstances brought this case within the rule of the court for the protection of patent rights of long enjoyment; without, at the same time, restraining the defendant from using his manufacture longer than was necessary for the plaintiff to establish his right by action. Under this view of the case, his lordship was of opinion that the injunction ought to stand for the present, and that the plaintiff should bring his action forthwith, in the Court of Exchequer, where it was supposed it could be tried sooner than in any other court;—thus confirming the order of the Vice-Chancellor.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1847.

Jan. 4. *Pearson & Winks*, of Sheffield, for a razor blade.

4. *William Higgs*, of 48, Newington-place, Kennington, for a chamber candlestick.

5. *James Jones*, jun., of Bow-street, and *Christian William Mc Neil*, of Heathfield, Wandsworth, for the *sine umbra* gas lamp.

5. *John Mc Pherson*, of No. 4, Melbourne-place, Edinburgh, for improvements on lamps for the inside of railway carriages or other useful purposes.

5. *Josiah Wilkinson*, of 9, Sherrard-street, Golden-square, for a coat, cape, or wrapper.

5. *James Barber*, of 112, High Holborn, for a double safety bolt.

5. *Edward Joseph Weston*, of Holborn, for wearing apparel.

6. *William Franks*, of 12, Bridewater-square, and *William Paul*, of Leather-lane, Holborn, for the national economic gas lamp.

6. *William Dunbibin*, of Nos. 92, and 96, Great Crosshall-street, Liverpool, for a bagatelle nouvelle table.

7. *Marcus Davis*, of 11, Upper Terrace, Islington, for an instrument for registering distances, or geometer.

9. *John Margetson*, of Cheapside, for the protector label.

11. *Charles Symons*, of 1, Princes-street, Fitzroy-square, London, for the independent bed-room fire-escape.

Jan. 12. *William Lewis*, of Frampton-on-Severn, Gloucestershire, for a waistcoat.

13. *George Webb*, of Wood-street, City, for the protection rouche tray.

15. *Robert Boyd*, of 21, Fishergate-street, Preston, Lancashire, tailor, for a coat (the Bernous).

18. *Benjamin Nickels*, of York-street, Lambeth, for the universal delineator, for the use of artists, &c.

19. *John Hunter*, of 16, Maddox-street, Hanover-square, London, tailor, for a supertunic.

20. *Edward Thomas Birch*, of Manchester, shuttle-maker, for an improved shuttle for weaving.

20. *James Startin*, of 3, Finsbury-place, Finsbury-square, for a pneumatic inhaler.

20. *W. & J. Galloway*, of Manchester, engineers, for internal flues in a steam-engine boiler.

21. *Harcourt Brothers*, of Bristol-street, Birmingham, for a door-lock spindle.

22. *Parker, Field, & Sons*, of 233, High Holborn, for a cartridge-belt.

25. *Hannah Smith*, of Bedford-street, Halifax, for a stiffener.

25. *Joseph Shires*, of Newton-street, Manchester, for an iron shoe or tip.

25. *Gabriel Davis*, of Leeds, optician, for a graduated medical galvanic machine.

25. *Jacob David Davis*, of 14, St. Mary Axe, in the city of London, for a coat.

26. *T. W. Atlee & Co.*, of Birmingham, for an ether inhaler.

26. *Charles Matthew Pace*, of 49, King-street, Westminster, for a cornopean.

27. *William Hammond Turner, James Turner*, and *Henry Turner*, of Manchester, button manufacturers, for a hook and eye.

27. *Richard Clark*, of 447, Strand, for the comet gas burner.

28. *James Freeman*, of 7, Little Chester-street, Grosvenor-place, Pimlico, whitesmith, for a chimney-cowl.

28. *R. W. Winfield*, of Birmingham, for an improved slide for gas lamps and chandeliers.

List of Patents

That have passed the Great Seal of IRELAND, from the 21st December, 1846, to 20th January, 1847, inclusive.

To William Johnson, of Grosvenor Wharf, Millbank, in the city of Westminster, Gent., for certain improvements in propelling carriages on railways.—Sealed 30th December.

Robert Warrington, of Apothecaries' Hall, in the city of London, chemist, for improvements in preserving animal and vegetable substances.—Sealed 30th December.

Henry Mapple, of Childs-hill, Hendon, in the county of Middlesex, machinist, for improvements in apparatus for transmitting electricity betwen distant places, and in electric telegraphs.—Sealed 30th December.

John M'Bride, of the firm of M'Bride and Company, cotton spinners and power-loom cloth manufacturers, Albyn Works, Glasgow, for improvements in weaving.—Sealed 30th December.

John Todd, of Glasgow, in the county of Lanark, engineer, and William Johnson, of Birmingham, in the county of Warwick, engineer, for improvements in arranging the rails on certain parts of railways.—Sealed 5th January.

Sir James Caleb Anderson, of Buttevant Castle, in the county of Cork, Ireland, Bart., for certain improvements in obtaining motive power, and in applying it to propel carriages and vessels, and to the driving of machinery.—Sealed 7th January.

Robert Mallet, of the city of Dublin, civil engineer, and John Somers Dawson, of the city of Dublin, coach-builder, for certain improvements in railway carriages, and in the machinery for working railways, parts of which are applicable to other carriages and to the bearings of other machinery,—partly invented and partly had communicated to them by a foreigner residing abroad.—Sealed 15th January.

John Thompson Carter, of Drogheda, flax spinner, for a machine for crushing, bruising, and softening flax, hemp, China grass, and other fibrous substances, and otherwise improving the quality and spinning properties of such and the like fibrous substances.—Sealed 15th January.

List of Patents

Granted for SCOTLAND, subsequent to December 22nd, 1846.

To Eugene Bazile, of Rouen, kingdom of France, manufacturer, for improvements in obtaining heat during the manufacturing of coke, and applying such heat to various purposes,—being a foreign communication.—Sealed 23rd December.

James Napier, of Shacklewell, county of Middlesex, operative chemist, for improvements in smelting copper ores.—Sealed 23rd December.

George Ferguson Wilson, of Belmont, Vauxhall, London, and John Jackson, of Southville, Wandsworth-road, London, for improvements in the process of and apparatus for treating fatty and oily matters, and manufacturing candles and night-lights.—Sealed 24th December.

John Mc Pherson, of Greenhead, Glasgow, mill-manager, for certain improvements in weaving—Sealed 28th December.

William Little, of 198, Strand, London, publisher of the Illustrated London News, for improvements in machinery for printing.—Sealed 30th December.

Henry Mapple, of Childs-hill, Hendon, county of Middlesex, machinist, for improvements in apparatus for transmitting electricity between distant places, and in electric telegraphs.—Sealed 30th December.

Charles Payne, of Whitehall Wharf, Cannon-row, Westminster, for improvements in preserving vegetable matters.—Sealed 30th December.

David Davies, of Wigmore-street, Cavendish-square, London, coach-maker, for certain improvements in steps for carriages and other purposes,—being a foreign communication.—Sealed 30th December.

Adrien Chenot, of Clichy-la-Garenne, near Paris, for certain improvements in the treatment of metallic oxides and their compounds, and in apparatus for the same.—Sealed 31st December.

Stephen R. Parkhurst, of Leeds, manufacturer, for improvements in carding wool, cotton, and other fibrous materials.—Sealed 31st December.

Thomas Morton Jones, of Birmingham, for improvements in heating liquids and aeriform bodies.—Sealed 31st December.

Alexander Bain, of 11, Hanover-street, Edinburgh, electrical engineer, for certain improvements in transmitting and receiving electrical telegraph communications, and in apparatus connected therewith.—Sealed 5th January, 1847.

John Watson, of Glasgow, manager to Messrs. Gilmour & Kerr, power-loom cloth manufacturers, for improvements in weaving by Jacquard looms by power.—Sealed 5th January.

William Air Foster, of Glasgow, leather-merchant and boot-maker, for an improved mode of making belts (for driving machinery and for other like purposes), traces, reins, and other articles of leather, pelt, or parchment; and also certain apparatus or machinery therein applicable.—Sealed 7th January.

Henry Constantine Jennings, of No. 6, Cumberland-terrace, Regent's-park, London, practical chemist, for a new method or apparatus or machine for the better or more economic evaporation of fluids or liquids containing crystalline or other matters to be concentrated or crystallized.—Sealed 12th January.

Lionel Campbell Goldsmid, of Rue Mogador, Paris, Esq., for improvements in applying rudders to ships and other vessels, —being a foreign communication.—Sealed 21st January.

John Buchanan, of Queen-square, Westminster, for certain improvements in the construction of ships or vessels, and in propelling thereof.—Sealed 21st January.

New Patents
SEALED IN ENGLAND.
1846-47.

To William Knowelden, of Great Guildford-street, Southwark, in the county of Surrey, engineer, for improvements in steam-engines. Sealed 31st December—6 months for inrolment.

Stephen R. Parkhurst, of Leeds, in the county of York, manufacturer, for improvements in carding wool, cotton, and other fibrous substances. Sealed 31st December—6 months for inrolment.

George David Myers, of Budge-row, in the city of London, engraver and printer; William Cooper, of St. Paul's Church-

yard, bonnet manufacturer; and James Wansbrough, of Southwark-square, Surrey, hatter, for improvements in the manufacture of caps, bonnets, book-covers, curtains and hangings, show-cards or boards, labels, theatrical decorations, and coffins. Sealed 31st December—6 months for inrolment.

Charles Dowse, of Camden-town, in the county of Middlesex, for improvements in applying springs to braces, to portfolios, to hats and caps, and memorandum and other books. Sealed 31st December—6 months for inrolment.

Clemence Augustus Kurtz, of Salford, in the county of Lancaster, manufacturing chemist, for certain improvements in the mode of preparing and using indigo in the dyeing and printing woollen, cotton, and other fabrics. Sealed 31st December—6 months for inrolment.

Adrien Chénot, of Clichy la Garenne, near Paris, formerly a student in the Royal School of Mines in France, for certain improvements in the treatment of metallic oxides and their compounds, and in apparatus for the same. Sealed 31st December—6 months for inrolment.

Thomas Edge, of Great Peter-street, Westminster, for improvements in the manufacture of gas-meters. Sealed 31st December—6 months for inrolment.

Samuel Burrows, of Sheffield, in the county of York, fork manufacturer, for certain improvements in the manufacture of knives. Sealed 7th January—6 months for inrolment.

Pierre Louis Thimoté Thiers, of No. 40, Passage Choiseul, in the city of Paris, mechanician, for an improved instrument for drawing off the milk from the breasts of women, and for raising and protecting the nipple, both before and after child-birth. Sealed 7th January—6 months for inrolment.

John Clegg, of Oldham, in the county of Lancaster, machinist, for improvements in looms for weaving. Sealed 7th January —6 months for inrolment.

Moses Poole, of the Bill Office, London, Gent., for improvements in fish-hooks,—being a communication. Sealed 7th January —6 months for inrolment.

Charles Runhold Lothman, of Craven-street, Strand, Middlesex, chemist, for improvements in the manufacture of white-lead. Sealed 7th January—6 months for inrolment.

Joseph Berroit Pierret, of Old Compton-street, Middlesex, engineer, for improvements in steam-engines. Sealed 7th January —6 months for inrolment.

John Chubb, of St. Paul's Church-yard, in the city of London, patent lock and fire-proof safe manufacturer, and Ebenezer Hunter, the elder, of Wolverhampton, in the county of Stafford, lock-maker, for improvements in latches, latch-locks, and other locks for fastening. Sealed 11th January—6 months for inrolment.

Douglas Pitt Gamble, of Crouch End, Middlesex, Gent., for improvements in electric telegraphs. Sealed 11th January—6 months for inrolment.

John Platt, of Oldham, in the county of Lancaster, machine-maker, for improvements in the method of consuming smoke and economising fuel. Sealed 11th January—6 months for inrolment.

John Britten, of Liverpool, in the county of Lancaster, chemist, for certain improvements in machinery or apparatus for printing, ruling, and damping paper for various purposes. Sealed 12th January—6 months for inrolment.

Stephen R. Parkhurst, of Leeds, manufacturer, for improvements in rotatory engines. Sealed 14th January—6 months for inrolment.

Alexander Mc Dougall, of Longsight, in the county of Lancaster, Gent., for improvements in the manufacture of glue, and in treating products obtained in the manufacture of glue. Sealed 14th January—6 months for inrolment.

Joseph Seraphin Faucon, of Rouen, in the kingdom of France, banker, for improvements in the manufacture of soap. Sealed 14th January—6 months for iurolment.

Lionel Campbell Goldsmid, of Rue Mogador, Paris, Esq., for improvements in applying rudders to ships and other vessels,—being a communication. Sealed 14th January—6 months for inrolment.

John Fray Poole, of Bolton-le-Moors, in the county of Lancaster, book-keeper, for certain improvements in machinery or apparatus for spinning cotton and other fibrous substances,—being a communication. Sealed 14th January—6 months for inrolment.

Frederick Lesnard, of Chester-street, Kennington-lane, in the county of Surrey, engineer, for improvements in obtaining motive power. Sealed 16th January—6 months for inrolment.

Henry Grafton, of Holborn-hill, in the city of London, engineer, for improvements in railway wheels and apparatus connected

with railway carriages. Sealed 16th January—6 months for inrolment.

Daniel Powers Shears, of Bankside, Southwark, for improvements in the treatment of zinc ores, for the purpose of producing zinc ingots; which improvements are applicable to the production of other ores and metals,—being a communication. Sealed 19th January—6 months for inrolment.

Edward Vickers, of Sheffield, in the county of York, merchant, for improvements in machinery for cutting files,—being a communication. Sealed 19th January—6 months for inrolment.

John Read, of Regent-circus, Piccadilly, in the county of Middlesex, mechanist, for improvements in certain implements for the cultivation of land. Sealed 19th January—6 months for inrolment.

John Mc Intosh, of London, Gent., for improvements in rotatory engines, and in moving carriages up inclines, and in propelling vessels. Sealed 19th January—6 months for inrolment.

George Beadon, of Taunton, in the county of Somerset, commander in Her Majesty's Navy, and Andrew Smith, of Princes-street, Leicester-square, Middlesex, for improvements in warping or hauling vessels; which improvements are also applicable to moving other bodies. Sealed 21st January—6 months for inrolment.

Thomas Onions, of Calais, in the kingdom of France, engineer, for certain impovements in rotatory steam-engines. Sealed 21st January—6 months for inrolment.

Thomas Deakin, of King's Norton, in the county of Worcester, engineer, for improvements in the construction and arrangement of machinery to be used in cutting, stamping, and pressing. Sealed 21st January—6 months for inrolment.

William Breynton, of the Inner Temple, in the city of London, Esq., for certain improvements in rotatory steam-engines. Sealed 21st January—6 months for inrolment.

Francis Preston, of Ardwick, near Manchester, spindle-maker, for certain improvements in machinery or apparatus to be used in the preparation of cotton and other fibrous substances for spinning. Sealed 23rd January—6 months for inrolment.

Frederick William Jowett, of Burton-upon-Trent, in the county of Stafford, engineer, for certain improvements in telegraphic communication. Sealed 23rd January—6 months for inrolment.

Clemence Augustus Kurtz, of Manchester, in the county of Lancaster, manufacturing chemist, for a new manufacture of a certain coloring matter to be used in the dyeing or in the printing of woollen, cotton, silk, and other fabrics. Sealed 26th January—6 months for inrolment.

Richard Walker, of Rochdale, in the county of Lancaster, cotton spinner, for certain improvements in the apparatus for the manufacture of gas for illumination; which said improvements are also applicable to the manufacture of other products of distillation. Sealed 26th January—6 months for inrolment.

John Law, of York-place, Portman-square, Middlesex, Gent., for improvements in yarns, and the machinery by which the same are manufactured,—being a communication. Sealed 28th January—6 months for inrolment.

To Peter Armand le Comte de Fontainemoreau, of 15, New Broad-street, in the city of London, for certain improvements in the process and apparatus for treating fatty bodies and the matters producing them; such process and apparatus being equally applicable to the treating several other substances, and also for the process and apparatus necessary for the useful application of all those products,—being a communication. Sealed 28th January—6 months for inrolment.

John Braithwaite, of 39, Bedford-square, in the county of Middlesex, civil engineer, for certain improvements in heating, lighting, and ventilating. Sealed 28th January—6 months for inrolment.

Elizabeth Oudinot Lutel, of Addle-street, in the city of London, for producing a certain texture, elastic in some parts,—being a communication. Sealed 28th January—6 months for inrolment.

James Taylor, of Furnival's Inn, Middlesex, for an improved apparatus for boring into the earth,—being a communication. Sealed 28th January—6 months for inrolment.

William Phillips Parker, of 48, Lime-street, Gent., for improvements in bell machinery,—being a communication. Sealed 28th January—6 months for inrolment.

Thomas Webster Rammell, of 12, Dorset-place, Dorset-square, Middlesex, civil engineer, for improvements in the preparation and application of cork for linings, and other useful purposes. Sealed 28th January—6 months for inrolment.

CELESTIAL PHENOMENA FOR FEBRUARY, 1847.

D.	H.	M.	
1			Clock before the ☉ 13m. 51s.
			☽ rises 6h. 29m. A.
			☽ passes mer. 0h. 38m. M.
			☽ sets 7h. 39m. M.
	8	18	♃'s second sat. will em.
2			Juno greatest hel. lat. N.
	11		♃'s first sat. will em.
	21		☽ in Apogee
	—		Occul. *p*2 Leonis, im. 17h. 10m.
5			Clock before the sun, 14m. 17s.
	—		☽ rises 10h. 40m. A.
	—		☽ passes mer. 3h. 28m. M.
	—		☽ sets 9h. 0m. M.
7	13	3	♀ in conj. with ♄ diff. of dec. 0. 1. S.
8	10	54	♃'s second sat. will em.
8	11	39	☽ in □ or last quarter
9	12	56	♃'s first sat. will em.
10			Clock before the sun, 14m. 31s.
	—		☽ rises 2h. 54m. M.
	—		☽ passes mer. 7h. 24m. M.
	—		☽ sets 11h. 51m. M.
11	5	21	♂ in conj. with the ☽ diff. of dec. 5. 6. S.
	7	25	♃'s first sat. will em.
13	4	7	☿ greatest hel. lat. S.
	9	19	Ceres in □ with the ☉
15			Clock before the sun, 14m. 26s.
	—		☽ rises 6h. 51m. M.
	—		☽ passes mer. 0h. 11m. A.
	—		☽ sets 5h. 40m. A.
	1	44	☿ in conj. with the ☽ diff. of dec. 6. 26. S.
	3	30	♃'s second sat. will em.
	11	26	Ecliptic conj. or ● new moon
	12	31	♄ in conj. with the ☽ diff. of dec. 5. 30. S.
	13		☽ in Perigee
16	1	58	☿ in sup. conj. with the ☉
	3	43	♀ in conj. with the ☽ diff. of dec. 4. 48. S.
18	0	55	♅ in conj. with the ☽ diff. of dec 1. 26. S.
	9	21	♃'s first sat. will em.
19	2	17	☿ in conj. with ♄ diff. of dec. 0. 20. S.
20			Clock before the sun 14m. 3s.
	—		☽ rises 9h. 26m. M.
	—		☽ passes mer. 4h. 45m. A.
	—		☽ sets Morn.
21	20	13	♂ in conj. with Juno, diff. of dec. 11. 49. S.
	23	5	♃ in conj. with the ☽ diff. of dec. 3. 21. N.
22	1	13	♄ in conj. with the ☉
	3	59	☽ in □ or first quarter
	5	33	♃'s third sat. will im.
	8	4	♃'s third sat. will em.
	9	35	Vesta stationary
24			Occul. *u* Geminorum, im. 9h. 46m. em. 10h. 46m.
25	—		Occul. *k* Geminorum, im. 9h. 39m. em. 10h. 51m.
25			Clock before the sun 13m. 23s.
	—		☽ rises 1h. 18m. A.
	—		☽ passes mer. 9h. 3m. A.
	—		☽ sets 4h. 3m. M.
	11	16	♃'s first sat. will em.
26	10	33	♃ in conj. with the ☉
28			Occul. 16 Sextantes, im. 17h. 2m. em 17h. 50m.

J. LEWTHWAITE, Rotherhithe.

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CONJOINED SERIES.

No. CLXXXIII.

RECENT PATENTS.

To JOHN KERSHAW, *of Ramsbottom, in the county of Lancaster, cotton spinner, for certain improvements in machinery or apparatus used in the preparation of cotton or other fibrous substances for spinning.*—[Sealed 2nd October, 1845.]

THESE improvements in machinery or apparatus used in the preparation of cotton and other fibrous substances for spinning, apply to that class of preparation-machinery termed "drawing-frames" or "slubbing-frames," which are employed for the purpose of doubling two or more slivers of cotton or other fibrous material together, and consist, firstly, in the employment of certain revolving tubes or twisters, placed between the drawing-rollers and calendering-rollers of such machinery, for the purpose of imparting a false twist to the slivers; whereby they become more firm and tenacious previous to their being doubled together and deposited in the cans;—secondly, in doubling the slivers of cotton or other fibrous material from the bosses of separate and distinct rollers, instead of doubling together the slivers from the two bosses of one roller; whereby there is less likelihood of two weak or imperfect parts meeting together in the process of

doubling;—and, thirdly, in the application of a revolving waste-roller to the drawing-rollers in these machines, in such a manner as, that in the event of a sliver breaking, the waste-roller shall take up the sliver as fast as the drawing-roller delivers it, instead of its lapping around the drawing-roller, as is usually the case in the machines now employed for such purposes.

In Plate IV., the invention is shewn as applied to a drawing or slubbing-frame, used for preparing cotton and other fibrous substances for spinning. Fig. 1, is a plan or horizontal view of the apparatus, as seen from above; fig. 2, is a back elevation; and fig. 3, a transverse section, taken through about the middle of the same. *a, a,* are the end-framings of the machine, to which the roller-beam *b, b,* is attached; *c, c,* is the main driving-pulley; and *d, d,* the main driving-shaft. The cotton, or other fibrous material to be doubled, is placed in cans in front of the apparatus, from which it passes over a guide-roller *e, e,* to the drawing-rollers *f, f, f.*

It will be seen, by referring to the figure, that the drawing-rollers *f*, f**, at the ends of the frame, are made with one boss only, instead of two as is usual; by which contrivance the slivers from the bosses of separate and distinct rollers may be doubled, instead of doubling the slivers from the two bosses of one roller, as is ordinarily practised; so that, should any of the rollers be faulty, there is less chance of two weak points of the sliver meeting and being doubled together. The slivers of cotton or other fibrous material proceed from the drawing-rollers *f, f,* and pass through the revolving tubes or twisters *g, g, g.* These tubes or twisters are caused to revolve at a high velocity, by means of an endless belt or strap *h, h,* which passes over and under the tubes *g,* alternately, and round the carrier-pulleys *i, i, i,* to the pulley *k,* upon the main driving-shaft *d, d.* The tubes *g, g, g,* are, as before stated, for the purpose of imparting to the slivers a false twist, which lays the fibres of cotton or other material more even and straight than usual, and, at the same time, gives a firmness and solidity to the slivers, causing the fibres to lay in a much smaller compass in the cans. The slivers from the revolving tubes pass between

the top and bottom calendering-rollers *l, l, m, m,* and are then led upwards over the top calendering-rollers *l, l,* and passed through the guides *n, n, n, n,* (two slivers entering every guide). The slivers thence pass between the centre bosses of the calendering-rollers *l, l, m, m,* and are thus doubled and compactly united; in which state they are delivered from the calendering-rollers into the cans *o, o, o,* below. *p, p,* is the waste-roller, which is caused to revolve by a strap *q, q,* passing around the pulley *r, r,* on the end of the waste-roller, and over the main driving-shaft *d, d.* When a sliver breaks, it falls down, and is taken up by the waste-roller *p, p,* as fast as it is delivered from the drawing-rollers; and thus it is prevented from lapping itself round the top roller, as is usually the case.

The patentee claims, Firstly,—the application of the revolving-tubes (as above described and exhibited in the drawing) to, or worked in combination with, machinery employed for doubling "slivers" of cotton and other fibrous materials, for the purpose of imparting a false twist to the slivers, as they proceed from the drawing-rollers to the calendering-rollers. Secondly,—the method of doubling the slivers of cotton, &c., from the bosses of separate and distinct rollers. And, Thirdly,—the application of a waste-roller to the machines commonly known as "drawing," "slubbing," and "roving" frames, used in the preparation of cotton and other fibrous substances for spinning, in the manner and for the purposes hereinbefore more particularly described.—[*Inrolled in the Petty Bag Office, April,* 1846.]

Specification drawn by Messrs. Newton and Son.

To George Knight, *of the town and county of the town of Southampton, wine-merchant, for his invention of certain improvements in excavating and dredging; also in the formation of permanent and temporary harbours, canals, bridges, docks, and other similar works, and the apparatus to be employed therein.*—[Sealed 14th July, 1846.]

This invention is intended to facilitate the operations of excavating and dredging; it also embraces a plan for the

formation of permanent and temporary harbours, canals, bridges, docks, and other similar works; and a peculiar construction of submarine telescope.

In Plate V., are several views of the apparatus which the patentee proposes to employ in carrying out the various objects of the invention. Figs. 1, 2, 3, and 4, represent different views of the improved plan of forming or constructing sea-walls, docks, harbours, and wharfs, or foundations and defences for the same, by means of what the patentee terms a water-fender, which, with certain other appliances, may also be employed for excavating or removing banks or bars, composed of mud, sand, or other similar earthy matters, from the mouths or other parts of estuaries, rivers, and harbours. Fig. 1, represents a front elevation of a portion of a water-fender; fig. 2, is a plan view of the same, with a mud-extracting syphon applied thereto; fig. 3, is a transverse section, also with the mud-extracting syphon applied; and fig. 4, is a similar view. The water-fender is constructed of strong convex wrought or cast-iron plates *a, a, a,* which are furnished at their edges with longitudinal dovetailed grooves, into which long wrought-iron dovetailed rods or laths *b, b,* are slidden, when the edges of two plates are brought into contact. The detached view, fig. 5, shews, in section and upon an enlarged scale, this mode of connecting the plates together; whereby it will be seen that the plates *a, a,* are effectually prevented by the laths *b, b,* from yielding to any lateral strain to which they may be subjected. The plates *a, a,* are further secured in a vertical or nearly vertical position, by means of strong transverse cast-iron supports *c, c,* the bases of which, by being extended backwards, as shewn in figs. 3, and 4, will effectually support the fender against the weight of the external water.

The mud or sand-extracting syphon consists of a number of short pieces of tubing *d, d, d,* of any suitable and convenient dimensions, connected together by flexible joints *e, e, e,* so as to allow the whole length to be bent slightly out of a straight line, as may be required. This flexible pipe is bolted to one of the plates *a,* immediately over a culvert or hole *f,* made therein, and is secured in such a manner as will

effectually prevent the ingress or egress of any water, except through the interior of the flexible pipe. The outer end of this pipe is commenced by a flattened mouth-piece *g*, with a wide mouth, opening downwards, as shewn at *g*, in fig. 3; and the inner end of the flexible pipe is furnished with a face-valve *h*, by opening or closing which, a communication between the inner and outer sides of the fender is maintained or cut off, as may be required.

The several parts of which the fender is composed being properly connected together, and secured against the pressure of the water and other disturbing causes, the flexible pipe is adapted to the culvert or aperture, in the manner shewn in the figures; the outer end or mouth-piece *g*, being supported by chains or cables *i*, *i*, from a boat above, as seen in fig. 3; and as these chains or cables *i*, *i*, pass over windlasses in the boat, the mouth-piece *g*, may be raised or lowered at pleasure. When excavating, dredging, or removing mud or sand from the water intended to be deepened to the land which is to be realized or raised, the water must first rise in front of the fender to a sufficient height, as seen in fig. 3; the space behind the fender being free from water, the mouth-piece *g*, at the outer end of the culvert, is then lowered on to the sand, (its wide mouth being downwards); and the valve *h*, at the inner and opposite end of the culvert, is opened. The water in front of the fender is then allowed to flow through the flexible pipe and culvert, carrying with it a considerable portion of sand and mud, which will be stirred up by the disturbance and agitation of the waters. The attendants in the boat must be careful that the mouth-piece *g*, is kept sufficiently in contact with the ground, to oblige the water, as it flows through the pipe, to carry the sand or mud with it; but care must also be taken that the mouth-piece is not allowed to press too heavily on the sand, otherwise the water will not be able to get into the flexible pipe. When the space within or behind the fender is so full of water and mud, or has approached so nearly to the elevation of the water on the outside, that the pressure upon the mouth becomes insufficient to force up a reasonable portion of earth with the water, the valve is to be shut down, by which all the work is

suspended. The earthy particles then begin to subside, and the inner end of the flexible pipe should be raised up; to this end must be attached a flat quadrangular mouth, (as shewn in fig. 4,) as a draining syphon, and it must be suspended or made to float near the surface, by means of any suitable floating body, such as cork. The wide mouth-piece *g*, should also be removed, as its form may prevent the free egress of the water. When the earthy particles have sufficiently subsided within or behind the fender, the supernatant or clear water should be allowed to run off through the culvert; and this rush of water will act as a scourer—if scouring be needful in any spot within its reach,—or if the earth is wanted for backing-up or raising retrieved land, the scouring may be much evaded by keeping the delivery end of the pipe afloat, close to the surface of the water.

At figs. 6, 7, and 8, the means employed for loosening, detaching, and removing or carrying away rocks, and other hard or solid substances, which obstruct navigation, are shewn. To loosen or detach large fragments of rock from the main body, any convenient number of levers or crow-bars of suitable length are employed; their lower ends being pointed, so as to be readily inserted into crevices or fissures in the rock; and their upper ends being secured by cords, chains, or in any other convenient manner, to a long horizontal bar, attached to a floating vessel above. Fig. 6, represents an end view of the apparatus, holding a large fragment of rock detached from the main body; and fig. 7, is a side elevation of the same. The vessel is shewn at A, A, in figs. 6, and 7, and its transverse section presents the form of an equilateral triangle. It has a strong iron keel *j*, secured to an oak keelson, placed immediately above it; and from this keelson rise lateral ribs, to which the strong oak planking of the sides and ends is secured. The upper ends of these ribs are secured to longitudinal sills, which run along the top of the sides from end to end; and the planking of the deck is supported by horizontal transoms, extending across the vessel from sill to sill. A strong wrought-iron bar *k*, *k*, running from end to end of the vessel, a few feet above the deck, is supported by strong iron uprights *l*, *l*, *l*, the lower ends of

which are securely fastened to the keel below. When it is intended to remove a rock, the vessel A, is brought to the place when the tide is just beginning to fall, and a suitable crevice or fissure in the rock having been found by inspecting and examining the rock by the aid of the submarine telescope hereafter described, the pointed ends of the levers *m, m, m*, are inserted into the fissure, and forced down as far and as tight as possible. The upper ends of these levers are then secured to the horizontal bar *k, k*, as already mentioned; and as the water falls by the receding of the tide, the vessel A, will be suspended from the ends of the levers, which will therefore have to support its whole weight; the consequence will be, that the fragment of rock must, if the levers do not slip from their positions, yield to the great weight, and will be forced away from its place, and be detached from the main body of the rock. But if it should be found that the rock does not yield, the weight may be still further increased by filling the vessel with water, by means of a syphon; when the rock or obstruction must, unless under very extraordinary circumstances, yield and be forced out, and allow the vessel to descend to the water line, as shewn in the figure. When the object has been effected, the water must be pumped out of the vessel A, and then it will be ready to assist in a second operation. The fragment of rock having been thus loosened, it only remains to remove it to some suitable place. This is effected by the aid of tackling, in connection with a floating vessel, as shewn at fig. 8. The vessel B, is furnished with a number of upright cylinders *n, n, n*, open at both ends; the lower end being made with a trumpet-shaped mouth, in order to offer as little obstruction as possible to the passage of the chains or tackling *o, o, o*. Each of these cylinders or barrels is provided with an ordinary windlass, to which one end of the chains are respectively attached; their other ends passing down the cylinders *n, n*, into the water, are furnished with hooks or catches *p, p*, (seen detached at figs. 9, and 10,) for laying hold of the rock. The windlass may be furnished with any convenient number of chains, and these chains are worked by smaller guide-chains *q, q*, which are attached to them; the other ends of these guide-chains being held and worked by

persons in small boats, at a short distance, as at C. When by manœuvring the hooks or catches at the ends of the chains *o*, *o*, by means of the guide-chains *q*, *q*, the said hooks are made to catch against and hold some projecting portions of the loosened rock, the chains *o*, *o*, are wound round the windlass, and the fragment of rock is raised from its place, as shewn in the drawing, and carried away and deposited in any convenient situation.

In order to ascertain and decide upon the means to be adopted, under various circumstances, for carrying out such operations as that just described, the patentee has designed an apparatus, which he terms an hydraulic or submarine telescope. This telescope is shewn at fig. 11, and consists of two pipes or tubes D, and E, one of which is intended for the transmission of reflected light, so as to illuminate the object below, and the other is furnished with lenses. The pipes are formed of a number of lengths of tubing *r*, *r*, *r*, made of copper, zinc, iron, or other suitable material, screwed one into the other, as shewn in the drawing, so as to form water-tight joints; and they are secured by means of flexible joints *s*, *s*, to a large box or case F, which is open at bottom. The lower end of each of the tubes D, and E, has a strong convex lens *t*, for the purpose of preventing the water from rising in the tube; and the upper end of the pipe D, has a powerful reflector *u*, which reflects the light from the burner *v*, down the said tube into the box or case F, below. The two pipes are respectively secured to the sides of a boat, in which the observer and his assistant stand; and the whole apparatus may be moved about by means of convenient tackling in the boat, and secured by the buoys *w*, *w*.

The patentee claims, First,—the construction of permanent or temporary walls, wharfs, piers, and other similar erections, by means of a water-fender, as above explained, aided by the flexible pipe, or mud or sand extracting syphon and culvert; whereby land may be reclaimed and realized from the sea or water, and channels may be deepened, and banks of sand or mud, forming obstructions to navigation, may be removed or partially removed. Secondly,—the means above set forth and described, for loosening or detaching large fragments of

rock or other hard or solid obstructions, and removing the same from such places. Thirdly,—the means and apparatus above shewn and described, for examining or inspecting the state of the ground, or any objects at the bottom of the water.—[*Inrolled in the Petty Bag Office, January,* 1847.]

To William Henry Burke, *of Tottenham, in the county of Middlesex, Gent., for certain improvements in the manufacture of fabrics, which may, if required, be made air and waterproof; a part of the materials employed herein, when combined with other matters, being intended to produce coverings for vessels of capacity.*—[Sealed 20th January, 1846.]

The object of this invention is, firstly, to produce a smooth uniform surface upon the face of woven or felted fabrics of several kinds, by applying thereto a covering of peculiar material called "Clark's cloth," or of soft filamentous material, such as carded cotton-wool, by the agency of a cement, which may be made waterproof; secondly, to combine such fabric, or a soft filamentous material, with paper, for the purpose of giving it additional strength, and rendering it impervious to water; thirdly, to produce a thin membranous air and waterproof material, and coat or combine it with metal, for various useful purposes,—one of which is its applicability to covering the mouths and necks of bottles, jars, and other vessels of capacity, for the purpose of rendering them air-tight, in the same way as bladders and thin pliable sheet-metal has been commonly employed.

The first of these objects is effected in the following manner:—Any desired length of woven cloth, made of cotton or other suitable material, or of felted fabrics, being wound tightly upon a roller, is brought into connection with a corresponding length of a material known as Clark's cloth, made by a combination of cotton-wool and caoutchouc, as described in the specification of a patent granted to James Clark, of Glasgow, 1st February, 1843.* This Clark's cloth being

* For description of this manufacture, see Vol. XXIII., p. 262, London Journal.

also wound tightly upon a roller, both rolls of fabric are placed in a suitable frame, and their surfaces are brought into even contact by conducting them together between a pair of pressing-rollers, similar to ordinary calender-rollers. At the pinch of these rollers, between the two cloths, caoutchouc or other gummy material, composed in part of caoutchouc or gutta-percha (rendered plastic by rolling or masticating in a warm state, and further softening it by spirits of naphtha or turpentine, as is well understood), is applied. This plastic material is laid along the whole length of the rollers, and as the rollers revolve they will spread it over the inner surfaces of the two cloths, whereby they will be firmly cemented together. The so combined cloth, delivered at the back of the rollers, is then taken up upon a receiving-roller; and when the desired length of combined cloth has been thus obtained, the rolling operation is suspended. The next operation is to surface-coat that side of the united fabric made of Clark's cloth, for the purpose of rendering it perfectly waterproof; the motion of the rollers must then be reversed, in order to repass the combined cloth between them; at which time, a further supply of caoutchouc, mixed with gutta-percha, or any other suitable material, is applied, to give additional substance and color to the combined cloth. This caoutchouc, or gutta-percha and other matter, is to be applied as a dressing upon that face or surface which is covered with Clark's cloth; and it is effected by spreading the plastic material upon the face of the fabric at the opposite side of the rollers; when, by repassing it between the rollers, the surface of the fabric becomes covered with the gummy material, and is thus rendered perfectly impervious to air or water; and when dried in the air, or in a warm room, is fit for use as a waterproof covering.

Instead of employing Clark's cloth, a series of several slivers of cotton-wool, conducted from a series of carding-engines, are combined in continuous lengths, by passing them in connection between pinching-rollers, so as to form them into a consistent piece. After the slivers have been thus combined, the fleece is brought into contact with the woven or felted cloth and the plastic material, by similar

means to those already explained. This combined fabric may be coated with a plastic substance and coloring matter, in like manner, if desired, so as to give it a smooth impervious surface; or the cloth and the cotton-wool, of which the fleece is to be formed, may be dyed previously to their being combined.

The second feature of the invention, viz., coating paper with fibrous material and adhesive matter, is described as follows:—Take any desired length of paper, and wind it upon a roller, and having provided a corresponding length of Clark's cloth, pass them together between calender-rollers, as described under the first head of the invention (introducing the adhesive material between them, as above explained); the surfaces of the paper and Clark's cloth will then become firmly cemented together. Or, instead of employing Clark's cloth, place the roll of paper in connection with the machinery by which the slivers of cotton-wool are formed into a fleece, and then bring the surface of the paper, and of a fleece of cotton-wool, formed by the carding-engines, into contact between rollers, by which they will be combined in a dry state and made to adhere together, and may be immediately wound up tightly upon a receiving roller. This roller, with the paper and fleece combined, is then taken to the calender-rollers, and the loose edges of the cotton having been cut off from its end, the combined sheet is passed between the calender-rollers with a roll of plastic caoutchouc, or other compound adhesive material, laid upon the fleecy surface, so that the rollers in passing the sheet shall effectually press the adhesive material through the fleece, and cement the fibres of the fleece firmly to the paper.

When thus prepared, the paper may be colored, embossed, and ornamented, and rendered fit for the coverings of books, boxes, envelopes, buttons, and other purposes. It may also be used in a variety of situations where it may be desired to protect articles from damp, as paper-hangings, packages, window-blinds, and various other uses.

Under the third head of his invention, the patentee produces a membranous material resembling thin metal, by taking a thin quality of Clark's cloth, coated with the com-

position as above (or, instead thereof, one or more slivers of cotton-wool), and passing it between calender-rollers, together with plastic gutta-percha, or caoutchouc, or combinations of them with other materials, in the same way as above described. The sheet of thin membranous material, thus produced, is washed over with a solution of gutta-percha or caoutchouc in spirits containing fine powdered metal, as gold dust, silver, bronze, copper, tin, &c., which, when dry, will resemble thin plates of those metallic substances, and may be applicable to a great variety of ornamental purposes. The patentee sometimes prepares a thin membranous sheet, resembling metal, by rolling out between heated rollers, at a temperature of 100° Fahr., gutta-percha or caoutchouc, or combinations of those substances, without the Clark's cloth or cotton fleece; constantly applying hot water during the rolling, to prevent adhesion to the rollers; and when a thin membranous sheet has been thus obtained, it is washed over with a metallic solution, as before mentioned, which will give to the membranous sheet a metallic appearance. Or, instead of washing the surface with a solution, the pulverized metal (as gold dust, bronze powder, &c.,) is mixed with the plastic material during its preparation, which, when rolled out into sheets, will have the same metallic appearance. The latter preparation of metallic membrane is chiefly applied to making the coverings of vessels of capacity, required to be kept air-tight, such as the mouths of bottles and jars. This is effected in the following manner:—The sheets of membrane are cut according to the sizes required, and, if necessary, the pieces are formed into shapes upon metal blocks or models, rendered warm, (or the blocks or shapes may be coated with a solution of the gum) by means of which the material will readily accommodate itself to the like figure. When so formed, the model is immersed in cold water, which allows the shape to be withdrawn from the mould. These shapes being made somewhat larger than the necks of the vessels they are intended to cover, are readily passed over the neck, and by the application of heat before a fire, or immersion in boiling water, the membrane is made to shrink, and instantly attach itself closely to the vessel. This adaptation of the invention pro-

duces the exact appearance of a metallic capsule placed round the neck of a bottle or other vessel, and is intended to supersede, at a low price, the use of tinfoil capsules, commonly used to exclude air from wine, spirits, pickles, and other things required to be kept air-tight.

The patentee claims, firstly, uniting, by means of gum-elastic, a certain substance called Clark's cloth, with woven or felted fabrics, for the purpose of imparting thereto, when coated with a composition of materials as above described, a smooth, compact, and (if required) waterproof surface, not hitherto attained by such combinations of fabrics. Secondly,—the mode of producing a continuous fleece of cotton-wool, and combining such fleece in an indefinite length, by means of gum-elastic, with woven or felted fabrics, and rendering the same smooth, compact, and waterproof, by a dressing on the face, as above described. Thirdly,—the combination of paper with that peculiar fabric called Clark's cloth, or the combination of paper with a continuous fleece of cotton-wool cemented by gum-elastic, in the way described, for the purpose of giving strength to such paper, and rendering it waterproof. And, Lastly,—coating or impregnating fibrous or membranous materials with pulverzied metal, as described, for the purposes above mentioned.—[*Inrolled in the Petty Bag Office, July,* 1846.]

Specification drawn by Messrs. Newton and Son.

To Alfred Vincent Newton, *of the Office for Patents,* 66, *Chancery-lane, in the county of Middlesex, mechanical draughtsman, for an invention of certain improvements in the manufacture of sugar,—being a communication.*—[Sealed 23rd July, 1846.]

This invention of improvements in the manufacture of sugar refers to that part of the process in which the liquor of the sugar cane, as it runs from the mill, is operated upon, in order to bring it into a fit state for crystallizing in the coolers.

The improvements consist in an arrangement of apparatus whereby the cane juice is filtered, heated, skimmed, and run

off into coolers with greater expedition and certainty than heretofore, and with a considerable diminution of cost in manual labour; the moving parts of the apparatus being worked by steam or other equivalent motive power. In Plate VI., the improved construction of apparatus is exhibited in several views; fig. 1, being a plan or horizontal view; fig. 2, a vertical section taken in the dotted line A, B, of fig. 1; and fig. 3, a transverse vertical section, taken in the line C, D, of fig. 2. *a, a*, is an open boiler set in brick-work *b, b*; and beneath the boiler is a flue extending along its whole length, and proceeding from the furnace at *c*, to a chimney-shaft *d*. The draft in this flue is capable of being cut off, when required, by means of a damper, shewn in the drawing. The chimney *d*, is situated between two tanks *e, e*, which are provided with steam-jackets, and are connected by means of pipes *f, f*, with the open boiler *a*. Into these tanks *e, e*, the charge of lime is thrown, and the cane juice is run in after it has been separated by filtration from the feculent or extraneous matters which have passed with it from the mill employed for crushing the cane. The mode of effecting this filtration will be best seen by reference to figs. 2, and 3. *g*, is a horizontal shaft mounted in bearings on the side of a water tank *h*: this shaft carries two or more discs of wood, and on its outer end a pulley is keyed, to which rotary motion is conveyed from the main driving-shaft *i*, above the apparatus, by a band passing over a pulley on that shaft. Immediately above the shaft *g*, is an open pan or vessel *k*, provided on each side with a small roller *l, l*, mounted in brackets attached to the ends of the pan. *m, m*, is an endless web of wire-cloth which passes over the rollers *l, l*, and under the discs of the shaft *g*. *n*, is a branch-pipe, communicating with the tanks *e, e*, which are themselves, as before stated, in connection with the boiler *a*. The liquor, which flows from the mill wherein the cane is crushed, is run down a trough or channel, connected with the mill, on to the endless wire-cloth, which, by means of the band and pulleys of the shafts *g*, and *i*, is caused to travel slowly in the direction of the arrow. As the liquor flows on to the wire-cloth, it will percolate through and fall into the tank *k*, below, while the feculent or refuse matters will rest

on the cloth, and being carried forward by the cloth will fall into the water-tank *h*. The object of having water in this tank is to cleanse the wire-cloth of any glutinous or other matter that might otherwise adhere to it, and check the proper filtration of the liquor. While this operation is going on, the liquor flows from the tank *k*, along the branch-pipe *n*, into the tanks *e*, *e*, where it may, if required, be subjected to heat, by turning steam into the jacket provided for that purpose. The liquor thence passes along the pipes *f*, *f*, into the boiler *a*; the supply being regulated by the sluice-cocks and floats *f**, *f**. In this boiler *a*, at about the middle of its length, is a partition, which divides it into two; and attached to this partition is a channel *o*, for the purpose of carrying off the scum which is thrown on to the surface of the liquor in the division I, of the boiler, by the action of the heat in the flue beneath. This channel *o*, which is placed across the boiler *a*, at right angles to its length, presents a level or horizontal edge to the liquor in the division I; and this edge, which acts as a stationary skimmer, is made concave, as shewn in the drawing, the better to take off the scum, and prevent it hanging against the sides of the boiler. As the liquor flows into the boiler through the sluice-cocks at the upper end, a current towards the channel *o*, is created; which current brings with it the scum upon the surface, and passes it over the level edge of the channel, whence it flows down into a tank *p*, intended to receive the refuse matters, as shewn at fig. 4, which is a section taken in the line E, F, of figs. 1, and 2. It will be readily understood, that according to the height of this level edge of the channel, the sluice-cocks and floats *f**, *f**, must be adjusted, so as to regulate the supply of liquid to the boiler. If the flow of the liquid should not be found sufficient to carry forward the scum (as it rises on the surface) into the channel *o*, a fan or blower may be employed to impel a current of air on to the surface of the liquor, and thus expedite the operation. Beneath that part of the boiler *a*, where the partition crosses, the flue is widened, as shewn by dots in the plan view, fig. 1, in order to give a greater heat to the liquor, and cause it to simmer from the sides of the boiler. The liquor in the first division of the boiler having

been deprived, as above stated, of its scum and other refuse matters, is allowed to flow in a continuous stream through the sluice-cocks *o**, to the division 2, of the boiler, where it is subjected to a greater heat, by reason of the nearer proximity of the furnace, and also to a further skimming operation. Above this part of the boiler is a paddle-wheel *q*, *q*, which has the main-driving shaft *i*, for its axle. This wheel is so adjusted, that the float-boards or paddles will (as they successively come round by the rotation of the wheel) dip into the liquor, and push the scum on the surface to one side of the boiler, where an inclined plane is provided to receive it. The continued rotation of the paddles will carry forward the scum, now collected on the inclined surface, and deposit it in a channel *r*, made on the top of the side walls *b*. The action of the wheel *q*, will be best understood by reference to fig. 5, which is a sectional elevation taken in the line G, H, of figs. 1, and 2, It will be generally found advantageous to continue a given number of the paddles up to the shaft *i*, in order that they may act also as fans, and bring a current of air on to the surface of the liquor; by which means evaporation will be accelerated. The bed of the channel *r*, inclines towards the partition of the boiler, and there it is brought into connection with a large tank *s*, which is intended as a receptacle for all the matters swept out of the division 2, of the boiler, by the wheel *q*, when rotating in the direction of the arrow, fig. 5. This tank *s*, is provided with a small lift-pump *t*, which, when the liquor has been allowed a sufficient time to settle, is actuated by means of gearing connected with the main driving-shaft *i*, and made to pump up the clear liquor into the division 1, of the boiler *a*. The refuse in the tank *s*, after the clear liquor is pumped out, is run off by a sluice-cock into the refuse tank *p*, before mentioned. It may be also advisable to have a communication between each of the tanks *e*, and the refuse-tank *p*, as shewn at *e**, fig. 1, that when they are cleared out, the sediment may be run off by merely raising a valve in the bottom of these tanks. If steam is used for heating the tanks *e*, *e*, the waste steam may be conducted into the chimney-shaft, as shewn also at fig. 1. The skimming process having been carried on in the

division 2, of the boiler for a sufficient time, which will readily be ascertained by the practised attendant; the liquor is run through a cock *u*, into a smaller boiler *w*, where it is submitted to a still greater heat. This boiler is provided with a lift-pump *v*, which is supported in a bearing *x*, and has a spout capable of turning on a centre, for the purpose to be presently mentioned. The pump is worked by means of a crank and gearing, connected with the main driving-shaft *i*, in order to pump up the liquor from the boiler *w*, and let it fall in a continuous stream; by which the bubbles will be broken, and an overflow of the liquor will be prevented. The next operation is to transfer the liquor from the boiler *w*, to an adjacent pan *y*, which is placed immediately over the furnace fire, and rests at one end upon the brick-work, but at the other end is supported by studs, resting in brackets, fixed in the wall of the furnace, so as to be capable of tilting when required. To effect this transfer of the liquor from the boiler *w*, to the tilt-pan *y*, the spout of the lift-pump *v*, is turned round into the position shewn by dots in the drawing, and the pump is set to work, when it will throw a charge of liquor from the boiler into the pan *y*, where it is finally concentrated. The pan may be tilted by a chain attached to it, and passing over a pulley or pulleys, as shewn in the drawing, or by any other convenient means. When thus tilted, the charge of now concentrated liquor will run off by the pipe *y**, into the coolers *z*; and the same movement which caused the tilting of the pan will bring down a damper over the ash-hole, and stop the supply of air to the fire, by reason of the damper being attached to one end of the chain which is secured at its other end to the tilt-pan, and forming thus a counterpoise thereto.

It will now be clearly understood, that, by this improved apparatus and mode of working, the filtering, clarifying, concentrating, and cooling processes, will be simultaneously carried on in a uniform and expeditious manner. As the requisite time for submitting the liquor to the heat of the fire will vary in almost every case, depending upon the quality of the liquor and other causes, the inventor has not thought it necessary to enter into such minute particulars, as any

workman, competent to carry on the manufacture of sugar, will, by the usual tests, be able to ascertain the exact progress of the operation.

The patentee claims, First,—the construction of filtering apparatus, as above described and shewn in the drawings, for separating the feculences and extraneous matters from the cane liquor, as it runs from the crushing-mill. Secondly,—the application of the partition and channel to the boiler *a*, for the purpose of separating the scum from the cane liquor, and conducting it off into a refuse tank, as above described. Thirdly,—the application, in the manufacture of sugar, of rotating paddles or leaves, for skimming or taking off the scum and oleaginous matters from the surface of the cane liquor. Fourthly,—the application of a lift-pump to the boiler *w*, for the purposes above described. And Lastly,—the general arrangement and construction of apparatus, above described, and shewn in the drawing, for converting the sugar-cane liquor to a fit state for crystallization.—[*Inrolled in the Petty Bag Office, January,* 1847.]

Specification drawn by Messrs. Newton and Son.

To THOMAS JONES, *of Salford, in the county of Lancaster, machine-maker, for certain improvements in machinery or apparatus for preparing, slubbing, and roving cotton, wool, and other fibrous materials.*—[Sealed 22nd June, 1846.]

THIS invention relates to an improvement in the "flyer" employed for winding the sliver of cotton, &c., on to the bobbins, in that description of slubbing and roving machines known to spinners and manufacturers as "presser-frames." These machines, as is well known to persons acquainted with the preparation of cotton, &c., for spinning, are so called in consequence of the flyer being provided with a small presser-lever, for the purpose of guiding the roving and laying it in a compact and even state upon the bobbin.

The present invention consists in the peculiar form or construction of spring, and its application to the flyer for the purpose of imparting the required elasticity to the presser or

small guide-lever; and it may be applied either to what are called "single presser-frames" or to "double presser-frames," as required. In Plate IV., the improved spring is shewn in connection with the flyer of a double presser-frame, as described in the specification of a patent granted to Samuel Hardman, 27th August, 1841.

Fig. 1, represents an elevation or front view of a double presser-flyer, spindle, and bobbin, with the improvements shewn, as applied thereto; fig. 2, is a side view of the same; and fig. 3, is a sectional plan taken at about the line A, B, in fig. 1. *a, a,* is the spindle; *b,* the bobbin; and *c, c,* the flyer. The pressers *d, d,* are attached to the tubes *e, e,* and work on the ends of the legs of the flyer; *f, f*,* is a small spring, composed of one, two, or more narrow strips of steel, or of wire, as they may be made either flat, round, or otherwise. These elastic pieces are attached at one end to the leg of the flyer *c,* and at the other to the tube of the presser *d.* The peculiar formation of these springs is seen best in fig. 3,—the inner spring *f*,* may be either loose at one end, as shewn in the drawing, or fast at both ends.

The patentee claims the peculiar form, class, or description of spring or springs, usually called the C spring, when applied to presser-flyers (either single or double), and whether such spring or springs be made of flat or round or other shaped metal or material.—[*Inrolled in the Petty Bag Office, December,* 1846.]

Specification drawn by Messrs. Newton and Son.

To AMBROSE LORD, *of Allerton, in the county of Chester, toll collector, for certain improvements in furnaces and the flues of steam-boilers, for the purposes of consuming the smoke and economising the fuel.*—[Sealed 24th June, 1846.]

THIS invention consists in the application, to one boiler, of two furnaces or sets of fire-bars, which are to be fed or supplied with coal alternately; and also in arranging or constructing the flues and regulating the dampers in such a

manner, that the smoke, gas, and other unconsumed combustible matters evolved from the fire which has been last fed shall pass under and through the other fire when at a clear red heat, and be thus consumed. When the fire which was last fed has attained a red heat, so as to give out no smoke, the dampers are to be reversed, which will reverse the draught. The other furnace or fire-place may then be fed or supplied with fuel, and the smoke and gas from it will pass under and through the clear red fire, and so on alternately.

In order more clearly to explain his invention, the patentee has shewn two modifications, one with moveable grates, and the other with stationary grates. In Plate VI., fig. 1, is a vertical longitudinal section, and fig. 2, is an end view of a cylindrical boiler, with the improvements applied thereto. *a, a, a,* is the brick-work, supporting a boiler *b, b,* which has two oval flues *c, c,* and *d, d,* extending through it from end to end. The lower flue *c, c,* is provided with rails *e, e,* upon which the moveable grates *f,* and *g,* run, being provided with wheels *h, h,* for that purpose. It will be seen that the boiler *b,* is provided with a water-space *i, i,* about the centre, extending across the upper half of the flue *c, c,* and forming a bridge to direct the course of the smoke (or a bridge formed of brick-work may be used); and the flue *c, c,* is provided with cross-bars *k, k,* from which hang swing-doors *l, l.* When shut, these doors serve to direct the passage of the smoke and gases, and they may be opened for the purpose of removing the ashes. *m,* and *n,* are two upright flues, each leading to the chimney; and *o, o,* are the fire-doors, provided with air-valves, for the purpose of regulating the draught. When it is desired to heat the boiler, both of the moveable grates *f,* and *g,* are brought towards the fire-doors, and the fires are lighted. All the dampers are then opened, by placing the levers *p,* and *q,* (which work the dampers) in a perpendicular position; but as soon as one fire (say *g,*) has attained a clear red heat, it is pushed along the rails *e, e,* as far backwards as the bridge *i, i,* and the lever *q,* is pulled outwards, whereby the damper *r,* will be opened and the damper *s,* closed; and by means of the connecting-rod *t,* and lever *p,* the damper *u,* will be opened and the damper *v,* closed. The apparatus

will then be in the position shewn in the drawing, and the smoke and other combustible gases proceeding from the grate *f*, being guided by the swing-doors *l*, *l*, and the bridge *i*, *i*, will pass under the furnace and through the clear red fire on the grate *g*, and thereby be consumed and converted into pure heat; thus effecting a great economy of the fuel. When the fire in the grate *f*, has burnt clear, and the furnace requires a fresh supply of fuel, the grate *g*, is drawn forward towards the fire-doors, and fed with fuel, and the grate *f*, is pushed backwards close to the bridge *i*, *i*; the dampers are then reversed, by means of either of the levers *p*, *q*, thus altering the direction of the current or draught through the flues, and causing the smoke, &c., evolved from the coal upon the grate *g*, to pass under the furnace and through the clear fire in the grate *f*, and so on alternately. If it is desired to reduce the heat of the furnace, this may be readily done by drawing both of the grates towards the fire-doors, and opening or withdrawing all the dampers.

Fig. 3, is a horizontal section, and fig. 4, an end view of a cylindrical boiler, shewing the application of the invention with two stationary grates. *a*, *a*, is the brick-work, and *b*, *b*, the boiler, which has two oval flues *c*, *c*, and *d*, *d*, extending through the same from end to end, on a level with each other. These flues *c*, *c*, and *d*, *d*, contain the two stationary fire-grates *e*, and *f*, one at each end of the boiler. It will be seen also that at each end of the boiler there is a flue *g*, *g**, connecting the ends of the two flues *c*, and *d*; and that the fire-doors *h*, *h**, (which must be furnished with air-valves) are fixed in the flues *g*, *g**. These flues also communicate with the vents *i*, *i**, which lead to the chimney; and these vents *i*, *i**, are connected together by a flue (which is not seen in the drawing) passing under the boiler. Now, supposing the fire-grate *e*, to have just received a fresh supply of fuel, and the fuel upon the fire-grate *f*, to be burning at a clear red heat, then the damper *k**, in the flue *g**, must be opened by means of the lever *l**, which, at the same time, will close the damper *m**, communicating with the vent *i**; and the damper *n**, in the vent *i**, leading to the chimney, must be closed. At the other end of the boiler, the damper

m, must be opened, and the dampers *k*, and *n*, closed. The smoke from the newly-fed fire *e*, will pass through the flue *c*, *c*, along the flue *g**, under and through the clear fire in the grate *f*, by which it will be consumed and converted into pure heat, which the draught of the chimney will cause to pass through the flue *d*, down the vent *i*, under the boiler to the vent *i**, and thence to the chimney. When fresh fuel is supplied to the fire *f*, the dampers must be reversed, and of course the draught; and, consequently, the passage of the smoke and heated air will be reversed also.

The patentee remarks, that although the flues, in which the fire-grates are placed, are described as being oval, and also shewn in the drawing as such, yet he does not confine himself to that shape, although he would prefer its use, as allowing a greater width of fire-bars in the same circumference or area; nor does he claim the use of two fire-grates to one boiler; but he claims the application to one boiler of two separate or distinct fire-grates or furnaces (whether moveable or stationary), which are to be fed or supplied with fuel alternately, and which are to be connected together by flues, regulated by dampers in such a manner that the smoke and other products of combustion evolved from the furnace or fire-place which was last fed or supplied with fuel, shall be caused to pass under the other furnace or fire-place, and upwards through the fire of the same, for the purposes of consuming the smoke and economising the fuel.—[*Inrolled in the Petty Bag Office, December*, 1846.]

Specification drawn by Messrs. Newton and Son.

To William Ashby, *of Croydon, in the county of Surrey, millwright, for certain improvements in the manufacture of flour.*—[Sealed 25th April, 1846.]

The operation of dressing meal, in order to separate the flour from the bran, is usually performed in a cylinder covered with gauze, made either of wire, silk, or other suitable material, through which the fine flour is forced by means of a number of brushes, attached to a shaft or spindle, which is

made to revolve within the cylinder with considerable rapidity. The meal is fed into one end of the cylinder, and the bran leaves the cylinder at the opposite end, after all the flour has been separated from it; and, in order to prevent the meal from passing through the cylinder too quickly, or before all the flour has been thoroughly separated from the bran, it has always been considered necessary to place the cylinder in nearly a horizontal position, or with just sufficient inclination to allow the meal to descend gradually by its own gravity.

The principal alterations effected in the apparatus by the patentee consist in placing the wire-gauze or dressing cylinders in a vertical position, or nearly so, instead of mounting them in nearly a horizontal position, as has hitherto been the case. In consequence of this alteration of the position of the cylinder it is requisite to drive the brushes at a higher velocity than when the ordinary arrangement of apparatus is employed. This may be done at a less cost of power than is usually required for driving the brushes, as the meal does not offer so much resistance as when the cylinder is placed in a nearly horizontal position. The cylinder is also made to rotate on its axis, as this movement will facilitate the operation of dressing. The flour, when forced through the wire meshes or interstices of the dressing-cylinder, falls down on to revolving tables, and is from them removed by a suitable instrument into receptacles conveniently placed to receive it.

In Plate VII., fig. 1, represents a vertical section, taken through the centre of the apparatus; fig. 2, is a horizontal section in the line A, B, of fig. 1, or plan view of the apparatus, with the driving-pulley and band and the feeding-trough or shoot removed; and fig. 3, is another horizontal section taken in the line C, D, of fig. 1. *a*, *a*, *a*, is the cylinder, which is constructed in essentially the same manner as those ordinarily employed for similar purposes, but with one or two modifications, to suit the difference of arrangement and position, and which will be more particularly referred to hereafter. The cylinder is preferred to be covered with wire-gauze, as now extensively done; but any other suitable material, such as silk, may be employed, if desired. The wooden ribs or bands a^1, a^1, a^1, which secure the wire-gauze,

and prevent it from yielding to internal pressure, are bevilled off, as shewn in fig. 1, so that the flour may not be deposited thereon, as would be the case if the ribs offered any ledge to support it. The cylinder is furnished at its upper end with a wide hopper-shaped mouth *b, b,* into which the meal is fed from the trough or shoot *c,* and the lower end of the cylinder is furnished with a strong cast-iron cross-piece *d,* by which it is supported in a vertical position on the brass bearing *e,* of the cross-bar or bridge *f.* *g, g,* and *h, h,* are revolving tables or floors, connected to and moving round with the cylinder *a, a.* The upper table *g, g,* is intended to receive the finer portions of the flour, or that which first comes through the sides of the cylinder; and the lower table *h, h,* takes the coarser portions, or second quality. The cylinder also carries at its upper end a large horizontal toothed-wheel *i, i,* shewn by dots in fig. 2, and is actuated by an endless screw *j,* on the horizontal shaft *k,* which carries at its opposite end a pulley *l,* driven by a band coming from any prime mover. *m, m,* is an upright shaft, to which the brushes are connected, and passes up the centre of the cylinder *a, a.* The lower end of this shaft passes through the brass *e,* of the cross-piece *f,* and is supported in a brass step *n,* of the cast-iron cross-bar or bridge *o,* which is firmly bolted or secured to the framing. The upper end of the shaft *m,* passes through, and is supported by a brass socket, furnished with adjusting screws, and situated at the extremity of the horizontal supporting arms or bridge *p, p,* and carries a horizontal band-wheel or drum *q,* by means of which rotary motion is communicated to the shaft. The brushes are constructed in the ordinary manner, and are connected with or to the upright shaft *m,* by iron rings or boxes *r, r, r,* and set screws *s, s, s;* and by means of these latter (arranged and actuated in the manner shewn in the detached sectional views, figs. 4, and 5, and which will be hereafter more particularly described) the brushes may be simultaneously moved nearer to or caused to bear against the sides of the cylinder, as circumstances may require, or as the brushes wear away. The pressure of the brushes against the gauze sides of the cylinder being properly adjusted by the screws *s, s,* and the other parts of

the machine being in proper order, the action of the machine will be as follows :—

The shaft *m*, with its brushes, is set in rapid rotary motion by means of the strap or band of the pulley *q*, and the meal is gradually fed into the machine from the shoot *c*. The rotation of the brushes, and the motion communicated to the air thereby, will have the effect of throwing the light particles to the sides of the cylinder, and through the gauze, when they will fall on to the table *g, g* ;—the bran and heavier particles of flour will be carried lower down by their weight, and a further portion will be driven through the lower part of the gauze cylinder, and fall upon the second table *h, h*. If thought desirable, additional tables or floors may be employed, as may be required, according to the length of the cylinder. As a slow rotary motion is communicated to these tables *g*, and *h*, by being connected to the cylinder, the flour that becomes deposited thereon is carried round to exit apertures *t*, and *u*, one for each table, and is discharged through these apertures by means of the angular or inclined striker or discharging apparatus *v, v*. This apparatus consists merely of two flat pieces of wood, set at an angle, and mounted loosely on a centre pin, as shewn best in fig. 3, and very much resembles a pair of compasses partially open. As the tables *g*, or *h*, bring the flour round against one of the inclined sides *v*, of this instrument, it will be guided off the table in the direction of the arrows, and down the exit aperture and pipe to a receptacle below; and the bran will, from its superior weight, fall down from the cylinder through the tube or flue *w*, into a bin or suitable receptacle below.

The upright spindle or shaft *m, m*, (see figs. 4, and 5,) carries the expanding boxes *r, r, r*, in which the screws *s, s*, attached to the brushes, work. As the brushes wear away, it will be necessary to press them close up against the gauze sides of the cylinder; and, in order to move all the brushes simultaneously, they are connected to the screws *s, s*, which work in female screws, made in the expanding boxes *r, r*. Fig. 4, is a horizontal section or top view of one of these boxes, on an enlarged scale; and fig. 5, is a vertical section of the same. The outer ends of the screws *s, s*, carry radial

arms t, t^*, which are slotted, as shewn in fig. 5, for the purpose of receiving the bolts which secure the brushes thereto; and the other ends of the screws pass respectively through a box r, and carry a small bevil-pinion x, x. The expanding box is covered in with a lid, through which the upright vertical shaft m, passes. Immediately beneath this lid, and mounted loosely on the shaft m, is a horizontal toothed-wheel y, which is driven by a small pinion z, (see fig. 4,) on the lower end of the rod z^1. It will also be seen that the toothed-wheel y, is furnished on its under side with bevilled teeth 2, 2, which, by gearing into the teeth of the bevil-pinions x, will actuate these latter, and by that means move the brushes inwards or outwards, as may be required. Each box r, r, r, is furnished with a separate rod z^1, which passes up through a hole in the cross-plate z^2, at the upper end of the cylinder, as shewn in fig. 1, and terminates with a squared head, in order that it may be easily turned either way by means of a spanner or screw-wrench. The top, middle, or lower end of the brushes may therefore be adjusted, without interfering with either of the other parts, by simply turning the head of the rod belonging to the expanding box of that particular part. The iron cylinder is shewn in the drawings, as supported from below, but it may also be suspended from above, by means of a circular ledge-plate, on which it may be made to rest, and which should be secured to the fixed framing. A circular or annular plate is also bolted to the upper part of the cylinder, and rests on the fixed plate before mentioned, in such a manner as to leave the cylinder free to revolve, which is effected by means of a large toothed-wheel and pinion, as shewn in the drawings. The patentee remarks, that in place of forming the cylinder perfectly cylindrical, he sometimes makes it slightly conical, and mounts the shaft or spindle, which carries the brushes, in a moveable step, in such a manner as to admit of the spindle being raised or lowered by means of a set-screw below; so that, as the brushes wear away, instead of being made adjustable, as above described, they may be brought against the cylinder, and made to act properly, by merely lowering the shaft to which they are attached.

The patentee states, that he does not intend to claim any parts of the above-described apparatus, which may have been employed in a similar manner for similar purposes; nor does he confine himself rigidly to the plans shewn and described, of actuating the various parts, as these may be modified without departing from the nature and object of the invention; but he claims, Firstly,—the general arrangement and construction of apparatus above shewn and described. Secondly, —placing the dressing cylinder or cone in a vertical position, or at an inclination exceeding 45° from a horizontal line. Thirdly,—the plan, above shewn and described, of adjusting the brushes of dressing-cylinders, so that they may be regulated with facility, without unmounting the cylinder, or deranging or removing any of the working parts.—[*Inrolled in the Petty Bag Office, October,* 1846.]

Specification drawn by Messrs. Newton and Son

To WILLIAM WARCUP, *of Ashton-terrace, Coronation-road, Bristol, civil engineer, for certain improvements in the manufacture and arrangement of parts, and apparatus for the construction and working of atmospheric railways.* —[Sealed 11th August, 1846.]

THIS invention relates to the manufacture of the traction-tube of atmospheric railways, and consists in forming the tube in two parts, longitudinally; the upper part rising to permit the passage of the arm that connects the piston with the carriage to be impelled, and thus rendering the use of the ordinary longitudinal valve unnecessary.

In Plate VII., fig. 1, is a transverse section of a tube, constructed according to this invention; and fig. 2, is a longitudinal section of the upper portion of the tube. The lower half *a*, of the tube is secured to the roadway in the ordinary manner, and the edges of the upper half *b*, fit into grooves in the longitudinal ribs *k*, *k*, which are formed along the sides of the lower half *a*; the said grooves being lined with any soft or elastic material, to form an air-tight joint. The upper part or valve *b*, is lifted by wheels, to allow the piston-

arm to pass: these wheels may act inside the tube, as at *c*, or they may act on the outside. *d, d*, are iron plates, that carry the wheels *c*, and form the piston-frame. The valve *b*, is made in suitable lengths, which are joined together by means of metal bands or segments *e*, and *f*; the band *e*, being fixed on the end of one length of valve, and the band *f*, on the end of the adjoining length; and over both is fixed a third band *g*, between which and the band *e*, a piece of flexible material *h*, such as leather or India-rubber, is inserted, to form an air-tight joint, and yet admit of the valve bending, when it is lifted to allow the piston-arm to pass. The valve or part *b*, is held down at one side by hooks *i*, which, although they do not prevent the valve from turning on the point *j*, as a centre, yet retain it always in its place.

Fig. 3, is a transverse section, and fig. 4, a plan view of another method of constructing the tube and connecting the ends of the valve *b*. In this case, the valve-plates *b*, and b^1, are turned up at one edge, and held down by means of the rod or bar *l*, and hook-bolts *m*, (thus forming a kind of hinge-joint); and both edges of the upper half of the tube rest on a soft and elastic material. The adjoining ends of the two lengths *b*, and b^1, of the valve, are connected together by a segment or band of leather *n*, properly secured to both ends; and short lifters or pieces of metal *o*, and o^1, are fixed on the two ends; so that when the valve *b*, rises, it will act beneath the lifters o^1, and thus raise the valve b^1, to which they are attached; and when the valve b^1, rises, it will act beneath the lifters *o*, and thus raise the valve *b*.

Fig. 5, is a transverse section of another modification of the tube, somewhat similar to that last described; but in the present instance the hinge is formed by a strip of angle iron, fastened to the edge of the valve *b*, and held down by the hook-bolts *m*.

Fig. 6, is a longitudinal section of the adjoining ends of two of the lower portions *a*, to exhibit the mode of joining them.

The patentee claims, as his invention, the use of an atmospheric tube, divided longitudinally into two parts, whether connected by hinges or not, and forming a complete tube,

ready for exhaustion, when closed,—the longitudinal connection and joint between the top and bottom parts of the tube being effected without having recourse to the elasticity of the material of which the tube is composed, or to the intervention of an elastic material to form a hinge, as at present used by Clegg and Samuda, or otherwise; closing solely by the weight of the upper part, without the assistance of springs or other mechanical agency. He claims also the longitudinal ribs that form the abutments for the valve or upper half of the tube.—[*Inrolled in the Inrolment Office, February*, 1847.]

To Henry Lawrence Tobias Tschudy Von Uster, *of the College for Civil Engineers, Putney, in the county of Surrey, for improvements in apparatus or machinery for measuring and indicating the distance travelled by wheel carriages.*—[Sealed 2nd June, 1846.]

This invention consists in an improved arrangement of apparatus by which the distance travelled by a carriage may be ascertained and registered.

In Plate IV., fig. 1, exhibits a portion of a carriage with the measuring apparatus applied thereto; fig. 2, is a front view; and fig. 3, a vertical section, on an enlarged scale, of a snail-wheel, forming part of the apparatus. On the inner side of the nave or boss of one of the carriage-wheels *a*, is fixed the snail-wheel *b*, which gears into and drives the pinion *c*, on the upright axis *d*; this axis *d*, is mounted in a frame, secured to the axletree *e*, and it also carries a bevil-pinion, which gears into a bevil-pinion on one end of the axis *f*. The axis *f*, works in a frame affixed to the axletree, and is formed in two parts, one sliding within the other, but so that they will both rotate in the same direction. The axis *f*, is connected by a universal joint *g*, with one end of the horizontal shaft *h*, the other end of which is connected by a universal joint *i*, with a worm-shaft *j*, enclosed in a box *k*, suspended from the body of the carriage; so that, although a degree of elasticity and change of position will take place between the body of the carriage and the axletree, when

springs are applied to the former, such variation will not affect the working of the apparatus. The worm-shaft *j*, drives a toothed-wheel, fixed on the lower end of the upright shaft *l*, which is enclosed in a tube *m*, and communicates motion through the bevil-wheels *n*, *n*, to the apparatus or mechanism for registering the distance traversed by the carriage: this mechanism may be placed in any desired position, either inside or outside the carriage. The patentee prefers that the index should be constructed with two faces, one inside the carriage, so as to be visible to the passenger, and the other externally, so that it may be readily examined by the driver of the carriage.

Sometimes, instead of applying a snail-wheel to the inner side of the nave, the patentee fixes a screw-wheel on the periphery of the nave, or he connects it to the framing of the carriage, and applies a stop or clutch movement to the carriage-wheel in connection therewith, so that the latter may be removed,in order to be cleaned, or for any other purpose, without removing the screw-wheel; but in all cases he encloses, as much as possible, the parts likely to be affected by dirt and dust.

The patentee does not confine himsef to the above details, so long as the peculiar character of his invention be retained; which consists in giving motion to apparatus for measuring and indicating the distance travelled by carriages, by means of a snail or screw-wheel, and parts connected therewith.—[*Inrolled in the Inrolment Office, December,* 1846.]

To GEORGE LEWIS, *of High Cross-street, Leicester, in the county of Leicester, locksmith, for improvements in the construction of shutters and blinds for windows and doors, and in the construction of doors.*—[Sealed 7th April, 1846.]

THESE improvements may be described under three heads: firstly, a novel means of constructing and connecting the parts of flat sliding metallic shutters, designed to afford great strength, and also facilitate the means of opening and

closing them; secondly, a peculiar mode of connecting together strips of metal, to form blinds or shutters which may be wound upon a roller; and thirdly, the adaptation of parts of the foregoing improvements to the construction of doors.

The first part of the invention consists in constructing sliding shutters, by combining a series of plates, which are to be attached to a rectangular frame of metal by means of screws or rivets passed through the edges of the respective plates, and through the ribs and stiles of the rectangular framing,—thereby forming the shutter with sunk panels. By this mode of constructing the metal shutters, a space or groove is left between the sunk panels, behind each of the vertical stiles, for the purpose of receiving a dovetailed or other formed stud, extending from a lower sliding shutter; by which means the successive sliding portions of the entire shutter are held together and made to lift one another.

In Plate VII., fig. 1, represents a front view of one of the sliding portions of a shutter, constructed as described. *a, a, a,* shews the series of plates or panels, made of sheet-iron or other suitable metal, which, being rivetted or screwed near their edges to the stiles or ribs of the framing *b, b, b,* constitute one of the sliding portions of a shutter. Fig. 2, is a back view of the same, shewing the grooves *c, c,* formed behind the vertical stiles, which grooves may be dovetailed or otherwise shaped, according to the form of stud intended to work in them; and *d, d,* is a horizontal bar, placed at top as a stop for the studs to rest against, and also as a strengthener for the frame of the shutter. Fig. 3, represents, in transverse section, two of these sliding portions or panels A, B, connected together by the head of the stud *e,* (which is affixed to the lower panel A,) working in the vertical groove *c,* of the upper sliding panel B;—a similar stud *e*,* extends from the top of the panel B, for the purpose of taking into the groove of another panel above. Several of these sliding panels are exhibited at figs. 4, and 5, connected as they would be when applied to close a window. Fig. 4, is a back view of the combined sliding panels, applied to a window and partially drawn up; and fig. 5, is a transverse section of the

window and the shutters, representing one mode of suspending the shutters and drawing them up; with the taper groove *k, k,* in the side of the window-frame, by which they are guided in their ascent and descent. It will be seen at fig. 5, that one end of a chain *f,* is attached to the back of the lower panel. A chain at each side of the window will, of course, be necessary to support and draw up the shutter, as shewn at fig. 4. These chains *f, f,* attached to the lower panel, pass upwards and over pulleys or rollers *g, g,* and thence down to the barrels or rollers *h, h,* fixed upon a rotary shaft *i, i,* which, on being turned by a winch and endless screw *k,* cause the chains *f, f,* to be wound upon the barrels *h, h,* and by so doing, to draw up the lower panel A. When this lower panel has been lifted to the extent of nearly its perpendicular depth, the studs *e, e,* acting in the grooves *c, c,* of the next panel above, will have been brought up to the stop-bar *d*; and as the lower panel still continues to rise, the studs *e, e,* will lift the next upper panel, and so on. By similar means every successive sliding panel will be lifted, until the whole shutter has been raised into the space provided for its reception at the top of the window. It is scarcely necessary to say, that on turning the shaft and barrels *h, i,* in the reverse direction to the former, the chains *f, f,* will be unwound from their barrels, and allow the shutter to descend by its own gravity, so as to close the aperture of the window. By attaching the draught-chains to the upper sliding panel, and reversing the action, it is obvious that in a similar way shutters may be slidden upwards from a receptacle below, for the purpose of closing the window.

The patentee states, that he lays no claim to the invention of this mode of raising and lowering sliding metallic shutters, neither does he confine himself to that particular drawing-up machinery, as various other arrangements of mechanism may be employed for the same purpose, in connection with the improved construction of shutters.

The invention may also be adapted to shutters which open and close by sliding horizontally. In this case, the grooves for the studs to slide in are formed between the plates or panels at the back of the horizontal rails or stiles of the shut-

ter. Fig. 6, represents the front of one of the improved vertical sliding panels, and fig. 8, is a back view of the same. *a, a, a,* are the plates of metal, as before described, affixed by studs or screws to the stiles or framing *b, b*;—*c, c,* are the grooves at the back of the horizontal stiles, formed between the edges of the plates; and *e, e,* are the studs, extending from the front of one shutter and taking into the grooves of the next shutter; there being a vertical stop-bar *d, d,* affixed to the back edges of each for the studs to bear against, in order to push back the panels severally, when in the act of opening, and draw them forwards in the act of closing the shutter. Fig. 8, is the front elevation of a window, with such a shutter mounted before it,—the lower edges of the several panels having antifriction rollers, if necessary, to assist their sliding upon the window sill. A chain *f,* is attached to the back of the hindermost shutter, and brought over the barrel *h,* by the rotation of which the shutters are collapsed or slidden behind each other. Two other chains *g, g,* are attached to the back of the hindermost shutter, and passed over the barrel *i,* by the rotation of which the shutters may be drawn out and the windows closed. These horizontal sliding shutters may be moved by any other convenient machinery.

The second feature of the invention applies to blinds or shutters made by the combination of rails or narrow strips of plate iron or other suitable metal, which strips, in their ordinary construction, are connected together by metal hinges or links of different kinds, in order to enable them to be wound or lapped round a barrel or shaft. Such hinges or links, applied to winding or rolling blinds or shutters, have been found inconvenient from occupying much space and greatly increasing the weight and cost of the shutters. To obviate these objections flexible bands are employed, which are attached to the back of the series of rails or strips of metal by rivets or screws, or by other suitable means; and to prevent these connecting-bands being cut through, they are guarded with very narrow flexible strips of metal or wire. Fig. 9, represents a portion of a blind or shutter, formed of rails or strips of metal *a, a, a,* slightly overlapping at their lower edges, in

order to make the junctions of the rails more secure; and fig. 10, is a back view of the same, shewing the improved flexible band attached thereto, by which the series of strips are connected. These bands *b, b, b,* are made of leather, consisting of two thicknesses, properly stitched together, or one thickness of stout leather, slit open at the edges, and afterwards stitched together; and between the two, very narrow thin strips of steel or other metal *c, c,* are placed. The material of which watch-springs are usually made, or steel or other wire might answer the purpose; but the patentee prefers wateh-spring metal, so placed between the two thicknesses of leather; he does not, however, confine himself to leather, as bands made of strong woven material would do, if properly guarded throughout with flexible metal. Flat rope, so guarded, would probably be found to effect the same object, or wire rope if made sufficiently flexible. These flexible bands when attached to the back of the series of rails or strips of plate metal, by means of rivets or other metal fastenings, constitute a strong and compact blind or shutter, as shewn in the last-mentioned figure. By these means, metal blinds or shutters will be rendered much more flexible than they have heretofore been, and enabled to fold into smaller compass, thereby facilitating their winding upon rollers; and they will be much lighter, more readily made, equally strong, and rendered considerably cheaper than the rolling metal shutters and blinds, made after any of the old constructions.

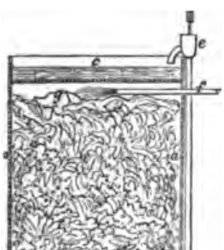
The third feature of the invention consists in applying panelled metal frames, of the kind above described, in the way shewn at fig. 8, or rails or strips of metal connected as described in figs. 9, and 10, to the purposes of sliding doors, which, being fitted to the aperture or doorway, may be worked, that is, opened and closed, by any suitable machinery; such machinery being well known as applicable to the working of shutters, need not be further described, as it forms no part of the invention.

The patentee claims, Firstly,—forming shutters by connecting a series of plates of metal, rivetted or otherwise fastened round their edges to stiles or metal frames, leaving

grooves between the plates, at the back of the stiles, for the reception of the guide-studs, by which the several sliding-frames are to be held together, and made to act upon one another. Secondly,—the adaptation of the peculiar kinds of flexible bands described, to connect a series of rails or strips of metal, for constituting, rolling or winding metal blinds or shutters. And Thirdly,—the employment of any of the preceding improved constructions for the purpose of constituting doors worked upon the sliding principle.—[*Inrolled in the Petty Bag Office, October,* 1846.]

To ROBERT REYBURN, *of Brown-street, Glasgow, chemist, for improvements in making extracts from animal and vegetable substances.*—[Sealed 17th June, 1846.]

THIS invention consists in obtaining extracts from animal and vegetable substances by means of the apparatus represented in section in the margin. It consists of a rectangular chamber *a*, of wood or other suitable material, furnished with several doors at one side, for the introduction of the animal or vegetable matters to be operated on, and having a perforated bottom *b*, through which the extract descends into a receptacle *d*, below. *e*, is a pump for removing the extract from the receptacle *d*, into the evaporating-pan *c*, which is situated at the top of the chamber *a*, so that the steam introduced by the pipe *f*, into the space *g*, beneath the pan *c*, will heat the pan, and evaporate or concentrate the extract; and it is the placing of an evaporating-pan over a chamber containing the matter from which an extract is to be obtained that constitutes the peculiar feature of novelty of this invention.



The action of the apparatus is as follows:—The chamber *a*, having been charged with the animal or vegetable matter, in such a manner as to leave a space *g*, between it and the bottom of the evaporating-pan, steam is admitted through the

pipe *f*, into the space *g*; and the steam and the water of condensation passing amongst the animal or vegetable matter will produce an extract, which descends through the perforated bottom *b*, into the receptacle *d*, and is from thence pumped up into the pan *c*, to be concentrated. The shape of the above apparatus, and some of the details, may be varied.

The patentee claims the mode of combining apparatus, as above described, whereby steam entering into a compartment *a*, containing the matter to be operated upon, is the means of producing an extract, and of evaporating it when raised into a pan *c*.—[*Inrolled in the Inrolment Office, December*, 1846.]

To THOMAS PAYNE, *of Handsworth, near Birmingham, Gent., for improvements in the manufacture of rolls for rolling iron and other metals.*—[Sealed 4th August, 1846.]

THIS invention relates to the manufacture of rolls for rolling iron and other metals. Hitherto it has been the practice to cast the rolls with axes or necks at the ends, which axes or necks are very liable to be broken when in use. Rolls have also been cast upon bars of wrought iron, in order thereby to strengthen the axes or necks; but, in such cases, the act of casting the roller has injured the wrought-iron bar; and rolls so made, have not, according to the patentee's belief, been better than those formed with cast-iron axes. Rolls with cast-iron axes or necks have also been cast with a small hole through the centre, so as to ensure better castings.

The above facts are stated, in order that the nature of the invention may be more clearly defined. It consists in casting the rolls hollow, and without axes or necks, and introducing wrought-iron axes or shafts into the same; the object being to produce rolls which shall be stronger than those heretofore in use. Care must be taken that the space within the rolls is cast truly, so that the shaft will fit accurately; and spaces must be left for the insertion of wedges or keys at the ends of the roll, which wedges or keys may be securely retained in the required positions by shrinking wrought-iron collars on

the shaft. The working journals are turned in the wrought-iron shaft after the roll is keyed on; and then the surface of the roll is turned. The patentee prefers that the wrought-iron shafts should be cylindrical; but he does not confine himself to that shape.

The patentee claims, as his invention, the manufacture of hollow cast-iron rolls, for rolling iron and other metals, and fixing therein wrought-iron shafts or axes, as above described. [*Inrolled in the Inrolment Office, February,* 1847.]

To THOMAS BELL, *of Don Alkali Works, South Shields, for improvements in the smelting of copper ores.*—[Sealed 23rd July, 1846.]

IN the ordinary process of calcining or roasting copper ores, bituminous coal, which gives off a great deal of smoke, is used; now the object of this invention is to employ anthracite coal, or charcoal, or the coke of bituminous coal, and at the same time to manufacture sulphuric acid.

In carrying out the invention a roasting furnace of three or four floors is employed, so that the air in passing from one floor to another will become highly charged with sulphurous acid; and this furnace is connected by a flue, with a roasting kiln (of the kind commonly used in alkali works for making sulphuric acid from pyrites) two or three feet square, and ten or twelve feet high; the flue being from one hundred and fifty to two hundred feet long, in order that all or nearly all the solid particles carried off from the furnace may be deposited in the flue. Each floor of the furnace is charged with ground or small ore, and the gas therefrom, entering the kiln at about two feet from the bottom, comes in contact with another portion of copper ore, in larger pieces, with which the kiln is charged. The kiln is arched over at the top, and from the arch a flue, about one foot square, extends to a sulphuric acid chamber. To increase the draft of the furnace and kiln, a jet of steam is introduced into the flue, near the acid chamber; the steam passes through an opening about one-fourth of an inch in diameter, and is used at a

pressure of thirty pounds to the square inch; and the power of the jet is such, that anthracite coal or coke can be employed in this operation: the steam also serves to supply the acid chamber with aqueous vapour for the condensation of the sulphurous acid. At a part of the acid chamber near where the gas and vapours from the kiln enter, the patentee introduces a supply of acid gases, produced by the action of sulphurous acid upon saltpetre or nitrate of soda. The acid gases and acid vapours, by their reaction, produce sulphuric acid, which is collected at the bottom of the chamber; but a considerable quantity of gases escape uncondensed, and these are conveyed to a series of tubes or columns containing coke, and furnished with suitable means of producing exhaustion (as described in the specification of a patent granted to the present patentee, November, 8, 1845*), where all or nearly all the gases are condensed. Instead of the means of exhausting the columns described in the above specification, a high chimney may be employed, when using these columns to obtain sulphuric acid in the smelting of copper ores.

The patentee claims the mode, above described, of carrying on that part of the process of smelting copper ores which consists in calcining or roasting the same, whereby he is enabled to manufacture sulphuric acid by employing anthracite coal, coke, or charcoal, in combination with a jet or jets of steam; and he also claims the use of columns of coke or other suitable material, with means of obtaining a draught through the same, when combined with apparatus for making sulphuric acid in the process of smelting copper ores, by using anthracite coal, coke, or charcoal.—[*Inrolled in the Inrolment Office, January,* 1847.]

To JAMES NAPIER, *of Shacklewell, in the county of Middlesex, operative chemist, for improvements in smelting copper ores.*—[Sealed 20th July, 1846.]

THE object of this invention is to facilitate the operation of smelting copper ores, and this the patentee proposes to

* For description of this invention, see Vol. XXVIII., p. 402, of our present series.

effect by the application of iron and alkaline substances, and by decomposing and disintegrating the products resulting from such application, by means of water.

If the ores contain less than twenty per cent. of copper, and more than two parts, by weight, of sulphur to four parts, by weight, of copper, they are first subjected to the ordinary process of calcining and melting, to produce what is termed "coarse metal." If the ores contain less than twenty per cent. of copper and a smaller proportion of sulphur than that above mentioned, other ores, containing sulphur in a larger proportion, must be mixed therewith, in such quantities that the average proportion of sulphur in the mixture will be two parts, by weight, to four parts of copper; and the mixture is then treated in the manner before mentioned for obtaining coarse metal. When the unmixed ores or the mixtures of ores contain more than twenty per cent. of copper, and a greater proportion of sulphur than one part, by weight, to four parts of copper, they are not subjected to the above processes of calcining and melting, but are treated at once in the manner described below for coarse metal.

To each ton of coarse metal, fifty-six pounds of soda-ash (containing about fifty per cent. of alkali) and fifty-six pounds of slaked lime are added, and the mixture is put into what smelters term a "metal furnace;" when it is in a state of fusion, any slag that may have formed is skimmed off, and a quantity of scrap-iron is introduced, in the proportion of one hundred-weight thereof to each ton of coarse metal. As soon as this is melted, the whole is well stirred with a rabble, and the furnace being immediately tapped, the fused mass is run into sand moulds. When the contents of the moulds are sufficiently set to be removed, they are put into a shallow pit, containing sufficient water to cover the whole, and allowed to remain therein from two to three hours; by which time the mass will have become partially decomposed and disintegrated. The excess of water is then run off, and the mass removed, and allowed to remain in a heap until the whole is reduced to a fine powder, which will be in about twenty-four hours. The powder is washed in any convenient manner, and introduced into a calcining furnace, in which the heat is

gradually increased for twenty hours, so that at the expiration of this time a bright yellow heat will be obtained; and this yellow heat is continued for six hours longer—care being taken to prevent the heat from increasing to such a degree as would cake or fuse the powder, and to stir the powder regularly at intervals during the whole time. The powder is now withdrawn from the calcining furnace, and after being sprinkled with water, according to the ordinary practice, is introduced into a fusing or metal furnace; and for each ton of the powder about one hundred-weight of pulverized anthracite coal and ten pounds of sand are added; a further addition of a quantity of sand or fluor spar, as a flux, being made if found necessary. As soon as the whole is well fused, the slag is skimmed off, and the furnace tapped into sand moulds. The product thus obtained is generally fit for the refining furnace; but if a small portion of it should be regulus, this regulus, which is rich in copper, is to be roasted, and afterwards refined. The slag, above mentioned, contains copper, and may be employed as a flux in charges for the ore-furnace, as usual.

The patentee states that he does not confine himself to the above details, as the proportions of the ingredients, the mode of adding the iron and alkaline substances, and the stage at which they are added, and likewise the duration of the processes, may be varied. He has found that potash and its carbonates will produce a similar effect to soda and its carbonates; but the former is more costly. He claims the application of iron with alkaline substances to the smelting of copper ores; and the decomposing and disintegrating, by means of water, the products obtained by such application.—[*Inrolled in the Inrolment Office, January,* 1847.]

To Jacque Kloet, *of Manchester, in the county of Lancaster, Gent., for his invention of a certain improved combination of materials, to be used as a substitute for leather, or for waterproof cloth, and other similar useful purposes.*—[Sealed 17th February, 1846.]

This improved combination of materials, to be used as a sub-

stitute for leather, or for waterproofing cloth, and other similar purposes, refers chiefly to the preparation of a mixture or cement composed of linseed oil (treated as hereafter described) and a solution of caoutchouc or India-rubber, and other ingredients hereinafter mentioned; which cement may be applied to one or both sides of any cloth or fabric, either manufactured from cotton, wool, or any other fibrous material. The linseed oil to be employed for the above purpose is prepared in the following manner:—Put twenty pounds of linseed oil and two pounds of coarse bread into a copper vessel, of sufficient size to contain four times that quantity; the oil is then boiled until the froth or scum is thrown up, and as soon as the bread is observed to rise to the surface of the oil, it must be taken out, and the oil will be found fit for use; the bread having absorbed or taken up all the impurities. When the oil is sufficiently boiled, add some spirits of turpentine, and then ignite the oil; let it burn about ten minutes, to evaporate the spirit, and then extinguish the flames. After this, take up some of the oil with a small iron ladle, and let fall a few drops on a piece of flat glass, to see whether it has long threads or fibres: if this proves to be the case, the operation is completed. After the examination, close the vessel which contains the oil immediately, with a wet woollen cloth, in order to exclude the air; then let it cool, and pour some cold water on it, to prevent the surface from getting dry and unfit for use. The solution of caoutchouc must be prepared as follows:—Take one pound of caoutchouc, cut it in pieces, and boil the same two hours in water; after it is well boiled it must be wiped dry, and cut again into smaller pieces; then add sixteen pounds of spirits of turpentine, and let it stand five days or thereabouts in a glazed pan, being careful that the pan is covered, so that no air can get into it. At the expiration of this period, place the solution in a copper vessel, over a slow fire, and boil gently, stirring it frequently with an iron instrument, until the whole of the caoutchouc is dissolved; after which, strain the solution, and it is then ready for use.

In employing the above preparation in the manufacture of the improved substitute for leather or for waterproofing

cloth, a piece of cloth or other fabric composed of cotton, wool, or other fibrous material, of the required texture and size, must be distended evenly and tightly in a suitable frame. The dissolved caoutchouc, above described, and a little siccative or drying oil, are then spread evenly upon the cloth with a suitable instrument; and after it has been left a day to dry, linseed oil, prepared as above, and afterwards mixed with a small quantity of acetate or sugar of lead, and a little drying oil, is applied thereto, by rubbing it well into the cloth, in order to fill up the interstices between the threads of the same. The fabric is then again left to dry. The next operation is to take one part of the solution of India-rubber, one part of the prepared linseed oil, a little acetate or sugar of lead, and a little siccative or drying oil, and mix the ingredients well together with a little lamp black; then lay any required thickness of this composition on to the cloth, and wash the surface over with some boiled linseed oil; let it dry again, and afterwards rub the surface well with pumice-stone until it is quite smooth. This done, wipe the surface with some clean linen rags, and let it dry again for a day or two. Then varnish it all over with black varnish (or other suitable color), and, when dry, take some very finely-ground pumice stone, and with a rubber, made of list or other suitable material, rub it over the cloth until it assumes a dull appearance, exactly similar to leather. The operation is then complete, and cloth thus prepared forms the improved substitute for leather, &c.; and when taken from the frame and trimmed at the edges, it is ready for the market. If any other color than black is required, this may be attained by the introduction of any suitable coloring matter, and the varnish wherewith it is varnished must be colorless.—[*Inrolled in the Petty Bag Office, August,* 1846.]

Specification drawn by Messrs. Newton and Son.

To Charles Dowse, *of Camden-town, in the county of Middlesex, Gent., for improvements in the manufacture and finishing of fabrics capable of being used as substitutes for paper.*—[Sealed 11th August, 1846.]

This invention consists in a mode of preparing woven fabrics

as substitutes for paper; which prepared fabrics may be written on with ordinary ink, printed on, and employed for other purposes where paper has been heretofore used.

The fabrics to be treated according to this invention are preferred to be made of cotton, but other woven fabrics may be employed: the patentee generally operates on calico, although figured woven fabrics may be used, if required. The fabrics are first singed, to remove the loose fibres, and then bleached; and if they are to be used as substitutes for colored papers, they must be dyed. The next operation consists in saturating the fabrics with a solution formed by dissolving one pound of resin in one gallon of a solution of soda or potash (containing about a quarter of a pound of alkali); —or resin or resinous matters dissolved in spirit with water may be used. The fabrics are then immersed in a solution formed by dissolving one pound of alum in one gallon of water (or a solution of alumina can be employed); after which they are conducted into a solution of starch, farinaceous matter, or gum, to impart the requisite stiffness, and fill up the interstices of the fabrics; and in proceeding from one solution to another, the fabrics pass between pressing rollers. The fabrics are next dried by stoves, steam cylinders, or other suitable means; and are afterwards submitted to pressure between rollers, or in sheets between plates, in order to glaze their surfaces.

A solution of white soap, or tallow, fat, or oil with alkali may be used instead of or in combination with the solution of resin or resinous matters; and a solution of barytes, strontia, lime, or magnesia may be employed in place of or in combination with the solution of alum; and gelatine may be substituted for or combined with the starch above mentioned.

The patentee claims the manufacturing of woven fabrics into substitutes for paper by treating them as above described, so as to produce woven fabrics which may be written on with inks ordinarily in use for writing on paper.—[*Inrolled in the Inrolment Office, February,* 1847.]

Scientific Adjudication.

COURT OF CHANCERY, LINCOLN'S INN.

Before the Lord Chancellor,—February 24th, 1847.

THE ELECTRIC TELEGRAPH COMPANY *v.* NOTT AND OTHERS.

THE Lord Chancellor this day gave judgment on an appeal from an order of the Vice-Chancellor of England, refusing an injunction to restrain the defendants from making and using electric telegraphic apparatus, alleged to be an infringement of the plaintiff's patent.

This cause, which has excited so much interest in the railway world, was, it will be remembered, brought on in the Vice-Chancellor's court in December last, and in consequence of the defendants filing certain affidavits during the pleading, further time was requested by the plaintiffs to prepare and file counter-affidavits in answer thereto. In January, the cause was resumed, and fully argued before the Vice-Chancellor—Mr. Bethell, Mr. Teed, and Mr. Heathfield, being heard on the part of the plaintiffs, and Mr. Stuart and Mr. Webster for the defendants. In the course of the argument, it appeared that in the year 1837, Messrs. Cooke and Wheatstone obtained a patent in respect of certain apparatus for transmitting electricity between distant places, and for an improvement for giving signals and sounding alarums at distant places, by means of electro currents transmitted through metallic circuits. In the years 1840 and 1842, further patents were taken out by the same gentlemen, for additional improvements in the construction and working of the telegraph; and eventually, an Act of Parliament was passed, to allow of the formation of a company to carry out the valuable principle of these inventions. The Electric Telegraph Company continued to enjoy the exclusive advantages of this patent until the early part of last year, when a patent was obtained by the defendants (Messrs. Nott and Gamble), for, as alleged, a new and improved mode of constructing these telegraphs. The grant of this last patent was opposed by the company before the Attorney-General, but without success; and the result has been that the defendants are in a fair way to undersell the old company, through the cheaper mode of constructing the telegraphs, unless hindered by the intervention of a court of law. Under these circumstances the plaintiffs filed the present bill for an injunction, which was refused by the Vice-Chancellor, on the ground that he conceived himself, to an extent, bound by a recent decision of the Lord Chancellor, in an alleged piracy and imitation of an almanack, and also that, from the tenor of the affidavits filed in the cause, there was sufficient doubt in the

matter to warrant the Court suspending its judgment, until the decision of a court of law had been invoked.

On the part of the company, affidavits, which went to shew the novelty and utility of Messrs. Cooke and Wheatstone's invention, and also the infringement thereof by the defendants, were made by Messrs. Farey, Carpmael, Roget, Miller, Wheatstone, Cook, Hatcher, Stephenson, Brunel, and others; and for the defendants, the affidavits of Messrs. Brand, Cooper, Backhoffner, Newton, Nott, Brittan, Fourdrinier, &c., went to prove the prior knowledge of the principle of electricity as applicable to the conveyance of telegraphic communications, and also the distinctive features of the two plans in question.

As the plaintiffs were not desirous to act on the suggestion of the Vice-Chancellor, and submit their right to the decision of a jury, the present motion was made, in the shape of an appeal, for the injunction.

For the plantiffs, it was contended that there could be no question as to their right to the invention of transmitting signals by electricity, for the use of such telegraphs was not mentioned in any Encyclopædia, or other scientific work, previous to their patent of 1837. The only question therefore was, whether the defendants' patent was an infringement of such invention? As the object of both patents was the same, surely the plaintiffs, who had the older title—a title too recognized by law and even by the Legislature—ought to be protected in it by a court of equity; the more so as it might be years before the final decision of a court of law could be obtained upon the merits of the two patents; and in the meantime an irreparable injury would be done to the plantiffs by the defendants carrying out their proposition of underselling them in the construction of the telegraphs. The learned counsel then went into an elaborate explanation of the apparatus described under the two patents, and urged that the specifications were, upon the whole, identical; that the principle in each was directed to accomplish the same object; that the moving power and clockwork mechanism for applying the electromagnet to signal apparatus were similar; that the same species of alarums was used; and that the mode of suspending the electric conducting wires used by the defendants was the same as that described in the plantiffs' patent. With regard to the difference between the patents, it was merely colorable, by the defendants using two magnets for working the mechanism, and four alphabets on the index plate; and therefore, as no adequate compensation could hereafter be awarded to the plaintiffs, the Court ought to interfere in the onset and prevent the anticipated injury.

For the defendants, it was insisted, that a manifest difference existed between their patent and the plaintiffs', in all matters which could be the subject of a patent as a new invention. The principle of transmitting signals by electricity was known as far back

as the middle of the last century, and therefore the only invention for which a patent could now be obtained, was for an improvement in the application of this principle. The defendants had not taken anything which was new in the plaintiffs' mode of applying this electric power, for the defendants used their electro-magnetic power in conjunction with a dead-beat escapement, while the plaintiffs employed a vibrating needle. In the next place, the plaintiffs made use of an alarum, which could be used for no other purpose, while the defendants employed a bell, by the strokes of which certain signals could be made. Then, the use of two magnets and a large dial plate, simplified the process of working the machinery; and, lastly, the defendants' mode of transmitting the electricity was by one wire, whereas the plaintiffs made use of five. The fact that the inventions were not the same, was borne out to a great extent by the plaintiffs having unsuccessfully opposed the defendants' patent before the Attorney-General; and the plaintiffs' want of confidence in their own case was shewn by their not having commenced an action at law, although leave had been given to them for that purpose by the Vice-Chancellor in the month of December. The parties ought, therefore, to be left to their legal remedies, and the undoubted superiority of the defendants' invention over that of the plaintiffs', in economy of construction, ought not to be taken from the public, except by the decision of a jury; for the defendants were enabled to construct their telegraph at the rate of £100 a mile cheaper than the plaintiffs.

Mr. Bethell then replied, and—

The Lord Chancellor stated that he would give his judgment on Wednesday.

The Court was this day crowded by persons interested in the decision.

His Lordship, in pronouncing judgment, referred to some cases which had been cited in the argument of counsel, and shewed that he had not carried the principle of granting the aid of the court even so far as Lord Eldon. That, in the present case, he would not go in opposition to the testimony of some of the most eminent men in Europe, who had distinctly alleged, that, although the same materials in the defendants' patent were applied to a similar purpose as in that of the plaintiffs', still the mode of application was new. His Lordship, therefore, considered that the view taken by the Vice-Chancellor was the right one, and that the plaintiffs had no grounds for coming to this court before their title was established at law. The judgment of the court below was therefore confirmed,—the plaintiffs to pay the costs.

We hope, in a future number, to give the Lord Chancellor's judgment verbatim, as it will most probably be cited hereafter as defining the practice of the Equity Courts in patent matters generally.

Scientific Notices.

ON THE PRECIPITATION OF GOLD.

BY M. BARRAL.

(Translated for the London Journal, from the Bulletin de la Société d'Encouragement.)

THE question discussed by the author of this paper is, "What are the conditions necessary for the precipitation of gold from solutions thereof in the metallic state, and upon the surface of other metals, either in a continuous and adherent layer, or otherwise?"

After having described the process of gilding by immersion pursued by Messrs. Elkington (for account of which see *London Journal*, vols. 18 and 19, conjoined series,) the author discusses the opinion, promulgated by Messrs. Dumas and Figuier, with respect to the property possessed by the alkaline bath of depositing gold upon the surface of jewellery or other articles, made of copper, by reduction of the perchloride of gold into protochloride. M. Dumas thought that the liquor might be considered as containing protoxide of gold, dissolved in the potash, and all the chlorine converted into chloride of potash. M. Figuier asserted, on the contrary, that it cannot be supposed that the protoxide of gold is the gilding agent, as that is effected by the tritoxide of gold dissolved in the potash.

In order to decide between these two theories, M. Barral had recourse to experiment; and the opinion he formed therefrom was, that M. Figuier was wrong in supposing that the dark violet precipitate which accumulates at the bottom of the vessels is protoxide of gold; he thinks also that the gilding agent may be protochloride of gold, when protochloride of copper is formed.

M. Dumas admitted that the object of boiling the liquor for two hours is to facilitate the reduction of the perchloride of gold, effected by organic matters contained in the bicarbonate of potash of commerce. M. Becquerel was also of the same opinion.

M. Figuier demonstrated that the gold may be withdrawn from the bath when in full action, in the state of tritoxide. M. Barral, on operating as directed by that chemist (M. Figuier), obtained a pretty considerable quantity of free auric acid; he was of opinion that the reduction of the gold is effected by degrees, as the process of gilding proceeds. M. Barral effected the gilding very promptly and with good effect by operating with perfectly pure substances, and dispensing with the process of drying with sawdust, *i. e.* proceeding with the gilding immediately after the first cleaning.

Gilders are in the habit of scouring the metal twice, because after the annealing and scouring of the metals much care is

required in cleaning and polishing the surface. The gilder immerses all the articles, within an hour from this operation, generally towards the evening, in the bath, where they become gilt in a few seconds. Instead of drying the articles in sawdust, they may be left in the water, by which they will be kept in equally good condition. The object of the second cleansing, which is effected in a mixture of sulphuric and nitric acid, with an addition of sea-salt to deaden the surface, is merely to take off the slight layer of oxide of copper which may have been formed since the first cleansing.

The bath used by Mr. Elkington contains a great excess of potash, the use of which was not understood. A fresh bath was prepared every day, with a fresh quantity of potash, and it was thought sufficient to extract the gold and re-dissolve it, without rendering the excess of potash available.

At present, in M. Christofle's workshops, one bath is made to serve many times. A quantity of perchloride of gold is added to the old bath until it contains no more carbonate of potash, but only chloride and chlorate of potash; it is then rendered fit for use by adding bicarbonate of potash.

According to M. Becquerel, the effects produced in gilding by immersion, and in precipitating metals from their solutions by other more oxidizable metals, are partly owing to the affinity of the metals, and partly to the electro-chemical action arising from the current resulting from the contact of the metal precipitating and the metal precipitated, and the concomitant chemical action.

From the foregoing, M. Barral thought that it would be possible to augment the quantity of metal precipitated, without increasing the proportionate quantity of metal dissolved; in other words, that, profiting by the current developed by the chemical action in gilding by immersion, much more gold could be deposited upon the articles without more copper being given off. The experiment which he undertook for the purpose of demonstrating this was perfectly successful. It is only necessary to immerse at the same time, in the Elkington bath, copper sufficiently cleansed and copper imperfectly cleansed, attached together by copper wire. The imperfectly cleansed copper causes chemical action to take place, and also gives rise to a pulverulent deposit of gold, a permanent solution of copper, and a galvanic current. Upon the well-cleansed copper there will be first a deposit of gold, according to the ordinary law of metallic precipitation, and afterwards a deposit of gold by electro-chemical action.

The process pursued by M. Barral for the purpose of augmenting to any extent the quantity of gold deposited, has nothing to do with that adopted by gilders in order to obtain a thicker layer of gold than that furnished by simple immersion. This plan, as is well known, consists in passing the articles already

gilt through a very weak solution of nitrate of mercury before plunging them a second time into the gilding bath, and this operation is in some cases repeated.

It is generally known, that gilding by immersion is employed principally for articles made of copper; for gilding silver articles this method has not been found to answer. According to M. Normand's process, in order to gild silver by means of the bath of gold dissolved in bicarbonate of potash, the bath is made to boil, and after immersing the articles to be gilt, some copper wire is added. The bath is stirred until a black precipitate is formed, when the copper wire is withdrawn and the articles are left to boil until they have acquired a yellow tint,—they may then be withdrawn and brushed. The bath is now left to settle, in order that the resulting precipitate may be removed; after which, it is again boiled, and the articles are re-immersed, a copper wire being kept in motion in the bath. If the color obtained is not satisfactory, the operation is recommenced. It will therefore be seen from the above, that it is possible to gild silver.

According to M. Barral, articles of silver only, when held in the bath by a gold or silver wire, will not take the gold, or at least so small a quantity, after being immersed for half or three quarters of an hour, as to produce merely a yellow film or thin surface; but if suspended in the bath by imperfectly cleansed brass wire, touching them first at one point and then at another, they will become covered with a layer of gold, which will be thicker in proportion to the number of points of contact with the brass, or as the extent of surface of the brass in proportion to the silver is increased. In any case, the layer of gold deposited in this manner is never very thick, but by employing imperfectly cleansed copper any thickness may be obtained.

Zinc alone will not take the gold in the Elkington bath, but it is covered with a large quantity of pulverulent precipitate of gold, and is rapidly dissolved. M. Barral was of opinion, judging from this, that possibly, in gilding silver by immersion, this metal might act more energetically than copper. This opinion has been fully borne out by experience; in fact it has been found that the gilding by immersion, being rendered electro-chemical by the contact of the articles with the zinc, may be employed in place of the mercury or battery.

M. Barral has succeeded in gilding iron and steel by simple immersion, but a very considerable time was required in order to obtain even a very thin coating. Zinc does not accelerate the deposit of gold upon iron; for this purpose lead must be used, as it is very speedily dissolved in the alkaline bath, being thickly covered with a pulverulent deposit of gold; and on being put in communication with the iron by means of a brass wire, that metal will be very thickly coated with gold, which will resist the action of the burnisher, and this even if the iron has not previously been well cleansed.

M. Barral annexed to his paper a table, giving the results observed by him on plunging various metals separately into Elkington's alkaline bath, and also plunging two of them in together.

Amongst the metals immersed singly, copper alone effects the gilding rapidly; but the coating is thinner in proportion as the surface is well cleansed. Silver, iron, and tin, become thinly coated and requires the process to be continued for a long time. Platinum, zinc, and lead, will not take the gold.

With respect to the metals immersed two together, on zinc and silver being used, the latter speedily acquires a very thick coating of gilt; and the same result is obtained with silver and lead, iron and lead, copper and lead, copper and zinc. Platinum and iron, silver and tin, acquire a very slight coating, which is thicker with copper, zinc, and lead; tin combined with copper takes a very slight coating, and it is the same with zinc when combined with lead.

The conclusion to be arrived at from the facts contained in M. Barral's memoir, is that all the ordinary metals may be instantaneously gilt with any thickness of gold by simple immersion (advantage being taken of the electric current generated by the chemical action upon the substances plunged in the Elkington bath) without employing any battery, either simple or compound. As the gilding process proceeds, pulverulent gold will be deposited upon the positive metal, which must be re-dissolved in *aqua regia*, in order to use it over again in the same bath. The author thinks however, that the expense of this dissolution will be compensated by the rapidity of the operation, the simplicity of the apparatus, the possibility of gilding various metals in the same bath, and the low price of bicarbonate of potash compared to that of cyanide of potassium.

ON THE EXPLOSIVE PROPERTIES OF CERTAIN VEGETABLE SUBSTANCES.

Whether it be that the mind of man is naturally so constituted as to prevent the association in one individual of the powers necessary to thread out and develope an important discovery, and likewise shew its applicability to the wants of man, or that the higher order of mind, in soaring after greater things, overlooks the practical, certain it is, that the genius to appreciate a discovery is seldom to be found united with the philosophic spirit which is ever anxiously prying into the mysteries of nature. From this circumstance, it may be, that the most startling results in science, and most beneficial inventions in the arts, if carefully examined, will be found to owe their gradual development, not

to the person whose name they bear, but to a combination of assistants, who have perhaps in some cases unconsciously contributed a little light to guide the ultimately successful explorer in the path of useful, because practical, knowledge.

This we do not say to detract from the merits due to the promulgators of the various inventions which have signalized this era, but it is rather a reflection on the singular facts which we have from time to time had occasion to mention, in connection with many recent discoveries, some of which have lain dormant for years, from previous labourers in the field, when in the act of striking where the treasure lay, turning aside and leaving it almost exposed to view; and others, working simultaneously, but unknown to each other, and simultaneously perceiving the fruit of their labors. A striking instance of this dormant knowledge has been furnished by the discussions which have taken place in Paris on M. Schoenbein's invention of the gun-cotton; for it is now ascertained, that in a paper "on the conversion of several vegetable substances into matters possessing a novel principle or property," by M. Braconnot, and published in March 1833, in the *Annales de Chimie*, from which we give the following translated extract, the elements of the new fulminating composition are described.

It is well known that dilute nitric acid dissolves the fecula of potatoes, and converts it into a mucilaginous liquid, very soluble in water; but with concentrated nitric acid a very different result is obtained.

In making experiments upon this fact, M. Braconnot added a sufficient quantity of acid to 5 grammes of fecula, and on the mixture being stirred from time to time a perfectly transparent mucilaginous solution was obtained; this was, by the addition of water, coagulated into a white caseiform mass, which on being crushed, well washed, and dried, weighed exactly 5 grammes, or the same weight as the quantity of starch originally employed.

The principal properties found by M. Braconnot to be possessed by this material are as follows:—

It is white, pulverulent, insipid, and does not redden litmus paper: if tincture of iodine be added to it, the latter will become discolored, and a yellow mixture will be obtained. Bromine does not act upon this matter: it softens and agglomerates in boiling water, without, however, being dissolved therein. It does not dissolve more easily by boiling it with sulphuric acid diluted with twice its weight of water; but with concentrated sulphuric acid a perfectly colorless solution is obtained, which is not precipitated by water, and which contains a gummy matter. The

new substance is easily dissolved by concentrated hydrochloric acid, especially if assisted by a gentle heat; but it may be entirely freed from it by means of water.

Concentrated acetic acid appears to be the only one which will act upon the substance in question, as it is easily dissolved thereby, and especially if assisted by heat; and the acid may even take up such a quantity as to convert it into a thick mucilage, which, when brought into contact with water, coagulates into a hard white mass: but on drying it by a gentle heat, it leaves a polished substance as transparent as glass, and which retains its transparency when immersed in water. M. Braconnot tried to form small microscopic lenses from this substance.

This acid mucilage if applied to paper or any other substance leaves a very brilliant varnish, which possesses the great advantage over that produced by the finest gum, of completely resisting the action of water.

Cloth impregnated with this mucilage, and afterwards dried, preserves the stiffness and impermeability it acquires thereby, even on being boiled in water. These being its properties, the utility of this novel substance in the manufacturing arts will be readily estimated. It may be mentioned, that it may also be dissolved in boiling vinegar, although in this case the solution becomes rather thick on cooling. Neither ammonia nor caustic solution of potash will act upon this substance, although in the latter it agglomerates and becomes translucid; but on boiling it a brownish solution is obtained, from which acids precipitate the substance dissolved, slightly changed, as it is then much more easily liquefied in boiling water, without being held in solution, and after drying, becomes transparent like gum, instead of a dead white.

If this substance be exposed to heat, it so easily takes fire that it is even sufficient to heat it upon a card in order to cause it to carbonize very speedily, as soon as it begins to liquefy, without injuring the card. If distilled in a glass retort, it leaves about a sixth of its weight of carbon, as difficult of incineration as that of the fecula itself, and also a brownish liquid containing a large quantity of acetic acid.

If put in contact with a solution of sulphate of indigo, more or less diluted, it will not alter the tint, and does not appear to take much, if any color; and it will not combine with the ferro-sulphate.

As this matter seems to partake in some degree of a ligneous character, the author has given it the name of *xyloïdine*. It may be produced from several other vegetable substances, by dissolving them in concentrated nitric acid.

Action of concentrated nitric acid upon ligneous and gummy matters.—On steeping sawdust in concentrated nitric acid, it will swell and become soft, without being dissolved, whilst cold. On heating it to a certain temperature, no effervescence will take

place, which is very remarkable; and a mucilaginous solution will be obtained, which will coagulate on again cooling. By means of water, a substance will be separated from it, perfectly identical with that first obtained by the solution of the starch in concentrated nitric acid. Cotton and linen on being treated with this acid will also be dissolved without apparent reaction, and will thereby be converted into xyloïdine; but xyloïdine cannot be produced from sugar cane—mannit and sugar of milk (a very bitter substance) being produced therefrom. Gum ,adragant, gum-arabic, inulin, and saponin which has been found in the bark of the *gymnocladus canadensis*, are convertible into xyloïdine by nitric acid; and the circumstance of a very bitter substance being produced at the same time, leads to the conclusion that these gummy substances most likely contain saccharine properties.

ON XYLOIDINE.—BY M. PELOUZE.

In a paper presented by M. Pelouze at the sitting of the Académie des Sciences, in November, 1846, he stated as follows :—

M. Schoenbein's gun cotton is nothing more than the xyloïdine discovered in 1833, by M. Braconnot. It will be seen from the preceding article, that that substance was produced by him by dissolving starch and some other organic substances in nitric acid, and precipitating the solution by means of water.

M. Pelouze shewed, in 1838, that xyloïdine was produced by the combination of the elements of nitric acid with those of starch, and demonstrated the excessive combustibility of that substance from its composition; he also found that instead of dissolving the cellular texture, it might be prepared with much greater facility and economy by simply impregnating paper, cotton, and hemp with concentrated nitric acid; and that these organic matters are not by this means altered in form, but are caused to take fire at a temperature of about 180° cent., and burn with great energy, leaving scarcely any residuum. M. Pelouze had anticipated that so remarkable a property could not long remain without being applied to some useful purpose, but he had not thought of applying it to fire-arms instead of gunpowder. M. Schoenbein is entitled to the sole merit of this application.

Eight years ago, M. Pelouze prepared inflammable paper by immersing it in concentrated nitric acid; at the end of twenty minutes the paper was taken out, well washed, and dried by a gentle heat. A pistol was a short time since charged with 1 decigramme of this paper, and the ball was driven through a plank two-thirds of an inch thick, at a distance of about 25 yards, and was afterwards flattened against the wall.

M. Prelat tried this azotic paper with arms of various kinds, and his opinion was, that it might be used instead of gunpowder

for pistols, without any disadvantage. One decigramme of the azotic paper, or gun cotton, being sufficient for one charge, it follows that 20 grammes of either of those substances will suffice for 200 discharges.

Similar results were obtained by experiments made by M. Lassaigne.

According to M. Pelouze, cotton prepared in the raw state would probably not produce the same results as when operated upon in the form of a fabric. There will naturally be a difference in substances so dissimilar in form and density, the cells of which contain a variety of extraneous matters.

The preparation of azotic paper is very simple, and may be quickly effected. The sheets of paper must be immersed singly, otherwise they will adhere; and must be taken out in the same manner at the expiration of a few minutes, and well washed. It is advisable to operate first on a small quantity of paper. Laid or hand-made paper, is preferable for this purpose.

It will readily be understood that by the employment of suitable apparatus, the preparation of this paper may be very expeditiously performed.*

ON THE THEORY OF DYEING, AND ITS APPLICATION TO VARIOUS PROCESSES IN GENERAL USE, AND MORE PARTICULARLY THAT KIND OF DYEING WITH INDIGO, CALLED VAT-DYEING.—

BY M. CHEVREUL.

In this paper (which forms one of a series presented by M. Chevreul to the Académie des Sciences) the author states the following facts, and draws the conclusions therefrom which will be found at the end of this article. The coloring matters by which fabrics made of organic matters are dyed, are fixed therein in three states:—1st, In a state of chemical combination; 2nd, In a state of simple (or mechanical) mixture; 3rd, A portion of the coloring matter is in a state of combination, whilst the remainder is in a state of simple mixture.

M. Chevreul then treats of the process of dyeing, as regards chemical combination, relatively to two circumstances attending the practical operation of the same.

A. Respecting the temperature:—1st, That of the atmosphere; 2nd, Boiling heat; 3rd, An intermediate temperature.

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* M. Pelouze has discovered that a mixture of gun-cotton and gunpowder may be employed, instead of fulminating mercury, which is generally used for percussion caps, and the manufacture of which is very dangerous.

For this purpose a small quantity of gun-cotton, or paper, and a few grains of gunpowder, are put into a copper cap of the ordinary shape and size and slightly compressed: this will act with as good effect as the explosive material in ordinary percussion caps.

There are, therefore, three methods of dyeing—the *cold process*, the *boiling process*, and the *warm process*.

B. Respecting the number of substances immersed, it is minimum when there is only the water, the coloring matter, and the fabric; the number is maximum when there is—1st, Water, which may hold in solution either an alkaline or acid substance, or a neutral body; 2nd, One or more coloring matters; 3rd, The fabric to be dyed; 4th, A substance called a mordant, the nature of which may be more or less complex.

M. Chevreul gives numerous examples of dyeing processes, considered as regards the above points; and examines the theory of Macquer regarding coloring matters, and the mode of fixing them, either with or without mordants. After demonstrating the incorrectness of this theory, he defines the art and science of dyeing from personal experiments, and insists upon their intimate connexion with chemistry.

He applies himself most particularly to demonstrate the influence of heat in fixing coloring matters in fabrics, when operating either in a boiling bath, or by means of steam. He shews the identity of the results in the two methods of fixing the colors, with this difference,—that a much larger quantity of water and mordant must be used with the boiling process, than when employing steam to fix a coloring matter, which had been thickened before printing.

M. Chevreul observes, that in certain cases, the substance used for thickening the coloring matter and the mordant acts as a preservative to the fabric, by weakening the corrosive action of the mordant. He is also of opinion, that in many cases where the boiling process is employed, steam may be much more advantageously used.

M. Chevreul also demonstrates, that by fixing indigo by the warm process upon wool, and by the cold process upon cotton, much advantage will be derived from the action of steam, and also by boiling in alum and tartar, as the fixity of the color is thereby remarkably increased. He considers the process of dyeing with indigo, as at present practised, principally on woollens, by the warm method and without mordant, to be very imperfect.

The author thinks himself justified in drawing the following conclusions from the result of the experiments described in his memoir, viz.:—

Felted cloth dyed in a blue-stone vat, is much improved by being treated with steam, or passed through a boiling solution of alum and tartar, or by passing it through water containing a mixture of scarlet and alum, also boiling; the two first processes are, however, preferable to the third.

Mousseline-de-laine treated with bran, or passed through subcarbonate of soda or lime, furnished precisely similar results. It was also shewn, that the action adds to the effect of the aluming process.

Analogous results were obtained with cotton, but the steam and aluming processes do not fix the color upon ligneous fibres so well as upon woollens. This was shewn on inspecting the samples of cotton and wool dyed with indigo, submitted to the Academy, and which were exposed to the atmosphere during the same space of time.

The questions which arise from the foregoing, are:—1st, Whether in all cases where the cold process has been employed, either with or without a mordant, the color would not be better fixed by boiling? 2nd, Whether, in all cases where the hot process has been employed without a mordant, a much better effect would not be produced by adding a mordant?

M. Chevreul concludes his memoir by an observation which leads us to hope that colors may be much better fixed than at present, both in dyeing and printing, by the addition of certain substances which are not mordants, as he has already shewn that gum-arabic and several other analogous substances, and also some fatty bodies, will fix indigo blue upon the fabrics independently of the boiling process or of a mordant.—[*Comptes rendus, &c.*]

REPORT OF AMERICAN PATENTS.

From the "Journal of the Franklin Institute."

BY MR. C. M. KELLER.

To JAMES ELLIOT, *of Newark, New Jersey, for an improvement in the machine for exercising invalids and others requiring physical exercise.*

THIS consists of a saddle placed on an elliptical spring attached to a stand, so that the invalid, seated on the saddle, can, by taking hold of handles attached to the stand, work himself up and down.

Claim:—"What I claim as my invention, and desire to secure by letters patent, is combining a saddle, or other suitable seat and spring, with handles, the whole being mounted on a suitable frame, substantially in the manner described."

To BENJAMIN T. RONEY, *of Attleborough, Pennsylvania, for an improvement in stoves.*

"I CLAIM, as my invention, the manner in which I have combined the coal-fire chamber with the wood-fire chamber, by placing the grate of the coal chamber partly within the top of the wood chamber, and in combination therewith the fluted form of the coal-fire chamber, to admit a draught from the wood-fire to pass though the coal chamber, as herein fully expressed."

To George Parker, *of Corinna, Maine, for an improvement in the windmill.*

"I claim, as my invention, the mode of regulating the speed of the mill by means of the fixed and moveable rudders, roller, cord, and weight, in combination with the circular platform to which they are attached, containing the wind-wheel and axle, and resting on friction-rollers, in the manner set forth."

This windmill is of the usual construction, with the wings on the end of a horizontal shaft. The turning platform at the top is provided with two "rudders," placed radially on each side of the shaft, one permanently attached, the other jointed and kept in radial position by a weighted cord passing over a pulley, so that, when the wind is too strong, this weight is overcome, giving the preponderance to the other rudder, which throws the wings out of the proper line for the action of the wind, to reduce the speed.

To James Brown, *of Newark, New Jersey, for an improvement in hats, such as are used by firemen and watchmen.*

The patentee says:—"I make the body of my improved hats of wool, and by means of proper moulds, or blocks, I form upon their crowns any desired number of welts or ribs; these welts or ribs I fill on the inside with some hard substance, which will cause them to preserve their form, and to resist the effects of a blow upon them."

This is claimed as an improvement on the well known method of making such hats of leather with welts or ribs.

Claim:—"Having described the nature of my improved hat, which is principally intended for the use of watchmen and firemen, I hereby declare that I do not claim to have invented anything new in the manner of forming such hats, but what I do claim as new, and desire to secure by letters patent, is the manner herein described of forming or combining of welts or ribs with hats having bodies of wool; such ribs being strengthened by filling the inside of the same with any suitable material, in the manner set forth; by which combination I form a hat, as hereinbefore stated, of a material not hitherto considered as applicable thereto, and possessing the desirable properties of lightness, and of being brought into market at a cost far below those that have been heretofore made."

To Jordan L. Mott, *of New York, for an improvement in stoves for heating apartments.*

This is for improvements applied to a stove having Mott's feeder, for preparing and supplying the coal to the grate, placed below and back of the shelf on which the coal rests; and these consist in bulging out the back of the stove, so as to give it an in-

clination backwards from the bottom to the upper line of the grate, and thence from that line upwards, giving it an inclination forward.

Claim :—" What I claim is the combination of the feeder, as described, with the bulged form of the back. I further claim the drawing in the upper segment of the back, over the coal, in combination with the shelf above the grate; and this I do claim without reference to the bulging of the lower segment."

To JORDAN L. MOTT, *of New York, for an improvement in the kitchen range.*

THIS range has two ovens, with the fire-chamber between them; the draught from the fire-chamber being first over the top of the ovens, down the side near the front, then under the bottom to the rear, then up the back to the connection with the flue leading to the chimney. In this way the draught, by means of dampers, can pass around both or either of the ovens. To facilitate the operation of cooking, stationary boiler-holes are placed over one oven, and a rotary top over the other, and extending partly over the fire-place.

Claim :—" What I claim is the combination, as follows :—The top range or stove, furnished with both rotary boiler-plates and stationary boiler-openings in combination with the divided draught, by which the heat can be made to act either on the rotary plate or the stationary boilers, or both, at pleasure, by merely changing the dampers."

To JAMES P. ROSS, *of Lewisburg, Pennsylvania, for an improvement in the corn-cutter and grinder.*

THE corn and the cob are cut by a series of excentric or circular saw-plates on a shaft, the teeth of which pass beteen permanent bars forming a comb; and when thus cut the pieces are delivered to a conical mill, where the whole is properly ground.

" I claim the series of excentric or regular saw-plates on the cylinder, in combination with the comb, for the purpose of cutting corn in the ear, or other substance, substantially as herein described, and in combination therewith. I also claim the conical mill for grinding the grain, &c., after being cut, substantially as herein described."

To ANDREW WEIKART, *of Green Village, Ohio, for improvements in the machine for boring timber.*

THIS improvement is for an arrangement of parts for securing the frame of the boring-machine to the timber to be bored, and the general nature of the mechanical arrangement for this purpose can be clearly gathered from the following :—

" I claim the combination of the strap, metallic plates, or bars,

connected by a cross-bar, and suspended on pivots, levers, and nicked plate, as set forth, for securing the machine to the timber to be bored, the said strap being hooked to the lever and passed under the timber, around the rollers, and between the bar and the side of the box, as described."

To MOSES PIERCE, *of Norwich, Connecticut, for an improved arrangement of the apparatus for bleaching cotton, &c.*

"I AM aware that the washing-machine, the keir for boiling, first in lime and then in an alkali, the 'chemics' or vats for containing the chlorine, and the 'sours' or vats for containing the acid solutions, have all heretofore been used separately; the pieces of fabric being attached together to introduce them to the washing-machine, and then separated to transport them by hand to the keir, and then re-transported and re-attached, to re-wash them,—and the same with reference to the chemics, and sours, and the washer; the whole of these operations of attaching, detaching, conveying, and re-conveying, being done by hand: and therefore I wish it to be understood, that I do not claim the using of these, in succession, in the process of bleaching, nor do I claim the passing of wet fabrics from a tub or vat, between rollers, to force out the liquid, as this combination has heretofore been known and used; but I do claim combining the washing-machine with the keir, by means of carrying-rollers or belts, provided with a reversed motion, so that the fabrics can be conveyed from the washer to the keir, and back from the keir to the washer, as herein described.

"I also claim combining the washer severally with the chemics or vat for containing chlorine, &c., in the manner described, so that the fabric may be conveyed from the washer to the chemics and the squeezing-rollers, as herein described; and, in combination with this last combination, the arrangement of the sours or vats for containing the acid solution, and the set of squeeze-rollers which receive the fabrics from the sours, after they have been conveyed therein from the first set of squeeze-rollers, and re-conveying them to the washer, as herein described.

"And, finally, I claim combining together the washing-machine, the keir, and the chemics, the first set of squeeze-rollers, the sours, and the second set of squeeze-rollers, in the manner described, by means of which the various operations in the process of bleaching are connected together, so as to convey and re-convey the fabrics from the one to the other in the order required, substantially as herein described."

To DANIEL HARRINGTON, *of Philadelphia, Pennsylvania, for an improvement in the ink-holder or ink-stand.*

"WHAT I claim is making the rotary top of the ink-holder with large central opening in the permanent top, which is also provided

with pen-holes, in like manner, as the rotating top; when the two are combined by means of the spring handle, which secures pen-holes, and a cup-formed recess in the middle, fitting in a the two together, and affords an easy and ready mode of removing the top to supply ink, whilst it answers the purpose of a ball-handle, to carry the ink-holder."

To NATHAN BUTTRICK, jun., *of Chelmsford, Massachusetts, for improvements in machinery for making lead pipes.*

CLAIM:—"Having described my invention, I claim the peculiar manner in which I arrange the cylinder with respect to one or two melting cisterns, and the furnace whereby the said cylinder is heated wholly or partially by the fire of the furnace, and receives its supply of lead, as above specified.

"I also claim the combination of the air-chamber with the forcing-cylinder, and the pipe former, in the manner and for the purpose or objects as above specified.

"I also claim the arrangement of the air-chamber within, or partially within, the melting cistern or cisterns, for the purpose of melting any lead which at any time may congeal, or may have congealed, within the said air-chamber, the said lead being rendered fluid by means of heat proceeding from the molten lead of the kettles, and passing through the sides (or a portion thereof) of the air-chamber."

The cylinder from which the lead is to be forced, is surrounded by a furnace, and provided with a piston to make the force-pump double-acting; and on each side of the cylinder, and partly within the furnace, is placed a melting-kettle, the two communicating by apertures with the cylinder, which is also connected with an air-vessel above, from which projects the tube or die, with a core within for forming the pipe.

As the piston moves in one direction, the pipe leading from the cylinder to the air-vessel is open, which permits the molten lead to pass into the air-vessel, and by the elasticity of the air is forced through the die; the opposite end of the cylinder being, in the mean time, supplied with lead from the other kettle preparatory to its operation on the return of the piston.

To JOHN R. CHOLLAR, EBER JONES, and PETER LOW, *of Troy, New York, for an improvement in the cooking-stove, called the "improved empire."*

THE patentees say,—"The nature of our invention consists, first, in the method of attaching the hearth of the fire-chamber to the stove, without casting any projections on the stove-plate, by providing a flanch to the bottom and sides of that part of the hearth which is towards the stove, and to bear against the stove-plate, and with another flanch beyond the first, sufficiently far to pass within the stove-plate and hang on it; in this manner the hearth

is sustained by having the edge of the stove-plate embraced between the two flanches. And, secondly, in uniting the oven-bottom with the stove-bottom, in such manner as to form the flues with cemented air-tight joints; the stove-bottom being provided with two vertical plates, which extend up to the oven-bottom, composed of three plates, with the edges bent down and resting against the sides of the vertical plates projecting from the stove-bottom; the junction of the edges of the plates being such as to form channels for the reception of cement of any kind, to render the joints air-tight.

"We claim the method, herein described, of forming the oven-bottom, and uniting it with the flue division plates, by the bent or curved edges of the plates forming the oven-bottom, and fitting against the division plates of the flues in such manner as to receive a cement to render the joints air-tight, substantially as herein described."

To John W. Baker and William W. Riley, *of Columbus, Ohio, for an improvement in the instrnment for extracting teeth.*

This is for combining the hook with the forceps handles, by having the hook turn on the end of one of the handles, whilst its upper end or projection is jointed to the end of the other handle, so that the working of the handles will open and close the hook.

Claim:—"What we claim as our invention, and desire to secure by letters patent, is the combination of the forceps handles, with the manner of controlling the hook, substantially in the manner and for the purpose described."

To Thaddeus Hyatt, *of New York, for an improved illuminating vault cover.*

Claim:—"Having described the nature of my improvements in the illuminating vault cover, I claim therein as new, combining with the covering plate a series of glasses of any suitable form, or of lenses; such combination being effected substantially in the manner described, by the aid of laminæ of wood or soft metal, and the glasses or lenses being defended from injury by knobs or protuberances, as herein set forth."

The glasses, which are conical, are let into wood, and the wood then secured to an iron frame with the large part of the glasses downwards, and their edges resting on the edges of the holes in the metal plate. Between each glass there is an iron projection to prevent the surface of the glasses being scratched.

To Joseph Johnson, *of Wilmington, Delaware, for improvements in smut machines.*

Claim:—"I wish it to be understood, that I do not claim as my invention the close cylinder, having projections thereon, nor do

I claim constructing the concave with projections from its inner surface; but what I do claim as my invention, and desire to secure by letters patent, is the combination of a close cylinder not admitting air at the ends, constructed as above set forth, with a concave having vertical projections thereon between the rows of holes in the said concave, in the manner and for the purposes herein described and in contradistinction to an open cylinder, with said projections combined.

"I also claim the fan constructed in the manner described, with inclined heads to the case for the purpose described, in combination with the smut machine,—all arranged as herein set forth."

The fan is constructed in the usual manner, but the heads are inclined for the purpose of forming a reservoir of air at each end, one communicating with a vertical trunk, which supplies air to the upper end of the fan, and the other with a separating trunk to clean the chaff and dirt.

To Charles Thurber, *of Norwich, Connecticut, for a machine for writing, called the "chirographer."*

The patentee says:—"The nature of my invention consists in communicating to pen or pencil-holder, the motions necessary to delineate any and all letters or other characters, by motions at right angles to each other, obtained by sets of cams, each set being so formed as to combine the right angle movements, and thus generate the vertical, horizontal, oblique, and curved lines, required to delineate the letters or characters. Each set of cams is actuated by a separate and distinct lever or handle, as in a pianoforte; and the table with the paper, &c., caused to move forward the required distance at the termination of each letter or character, by the return motion of the lever or handle.

Claim:—"Having pointed out the principle of my invention, and the manner of constructing and using the same, and indicated some of the variations in construction which may be made without changing the principle or character which distinguishes it from all other things before known, what I claim as my invention, and desire to secure by letters patent, is communicating the motions to the pen or pencil by means of cams acting on frames, so that the vertical and horizontal strokes can be given by separate movements, and the oblique and curved strokes, by the combined action of the two, substantially as herein described.

"And I also claim giving to the sheet of paper, or other substance to be written upon, a horizontal movement for spacing off the letters, and a vertical movement for the lines in combination with the movements of the pen or pencil, substantially as herein described."

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1847.

Jan. 29. *Horne, Thornthwaite, and Wood,* of Newgate-street, London, opticians and philosophical instrument-makers, for an improved design for a portable case for holding photographic or calotype plates, or sheets of paper.

29. *James Cartland and Sons,* of Birmingham, for a self-closing vertical plate for letter-boxes, &c.

30. *William Rileigh,* of 1, Stewart's-place, Brixton-hill, for a crown-head invalid chimney-top and ventilator.

Feb. 1. *Langford and Bristed,* of 9, Gresham-street, London, for the back shell of a die, and pressure-made button.

1. *John Walker,* of 48, Shoe-lane, carpenter and back-maker, for a pendant air-trap.

1. *William Rivett and Sons,* of 50, Crown-street, Finsbury, for a telescopic table-frame.

1. *Robert Clarke,* of Clitheroe, iron and brass-founder, for an oven-saddle.

2. *Morris Levinson,* of 5, Trinity-place, Charing Cross, for a self-adjusting clog.

2. *Abraham Marbe,* of Bridgewater, county of Somerset, for the galphonum spirit or oil lamp.

4. *James Freeman,* of No, 7, Little Chester-street, Pimlico, millwright, for a sugar-mill.

4. *Thomas Pugh,* of 13, King-street, Snow-hill, London, for a fastening for locks, and their accompanying box-staples.

5. *Robert Bowie,* of Fowkes'-buildings, Tower-street, surgeon, for a ventilating window-pane.

6. *Pretyman and Hobson,* of 17, Cornhill, London, for a lamp.

6. *Thacker and Radford,* of Hodson's-square, Manchester, for a demi shirt.

8. *William Marshall,* of 10, Victoria-terrace, Wynne-street, Birmingham, for an air-heater and distributor for gas-burners.

8. *Vincent Price,* of 33, Wardour-street, Soho, for an improved economical ironing stove.

9. *John Finlay,* of Glasgow, for an improved chimney-top.

11. *William Palmer,* of Sutton-street, Clerkenwell, for the glass of a lamp.

11. *William Thorowgood and Robert Besley,* of Fann-street, Aldersgate-street, letter-founders, for a Court hand printing type.

12. *John Fleetham*, of North Dalton, near Beverley, wheelwright, machine-maker, &c., for a turnip-cutter.
12. *Carpenter and Tildesley*, of Willenhall, for a door-lock.
13. *Lockwood Brothers*, of Sheffield, for an improved mortice guage.
13. *Edward Owen*, of Northumberland-street, Strand, for a brace
15. *E. Dench*, of Hurstpierre Point, near Brighton, for a metallic sash-frame for greenhouses, hothouses, forcing-pits, and other like horticultural purposes.
16. *William Ford*, of 10, Holles-street, Cavendish-square, for a lady's riding habit.
16. *Charles Massi*, of 31, Noble-street, Goswell-street, for a percolating galvanic trough.
17. *George Phillips Bayly*, of 146, Fenchurch-street, City, brush-maker, for an expanding brush for tubular boilers.
17. *Henry Pringle Bruyeres*, of Euston-square, superintendant of the London and North-Western Railway, for a day and night transparent auxiliary signal for railways.
18. *Miller and Sons*, of 179, Piccadilly, London, for a lamp.
18. *Peter Stevenson*, of No. 9, Lothian-street, Edinburgh, philosophical instrument-maker, for a saucer-valve and metallic screen, for preventing the transmission of flame to combustible materials.
19. *John Young*, of Ayr, engineer, for a machine for the manufacture of draining-tiles, &c.
19. *Fenton and Marsden*, of Sheffield, for an improved mortice-guage for cabinet-makers, joiners, &c.
20. *John and William Besemeres*, of Wood-street, Cheapside, London, for a club-house shirt.
22. *Huxley, Heriot, and Co.*, of Castle-street, Long Acre, ironmongers, for an economic gas-stove.
22. *Robert Bowie*, of 1, Fowkes'-buildings, Tower-street, surgeon, for a tile for baths, wash-houses, dairies, &c.
23. *William Bedington, jun.*, of Birmingham, for an improved burner and glass-holder.
24. *Alexis Soyer*, of the Reform Club, Pall Mall, and *John Thomas Prestage and William Ball*, of the firm of Bramah, Prestage, and Ball, of 124, Piccadilly, for for a tendon separator.
24. *Thomas Taylor Fountaine*, of 46, Albemarle-street, for a mantle coat.
25. *Hesketh Hughes*, of 1, Cripplegate-buildings, London, lace manufacturer, for a protection Rouche tray.

List of Patents

That have passed the Great Seal of IRELAND, from the 20th January to the 20th February, 1847, inclusive.

To Joseph Thomas, of No. 1, Finch-lane, Cornhill, in the City of London, publisher, for a new and improved tube,—being a communication.—Sealed 25th January.

George Fergusson Wilson, of Belmont, Vauxhall, in the county of Surrey, Gent., and John Jackson, of Southville, Wandsworth-road, in the same county, Gent., for improvements in the processes of, and apparatus for, treating fatty and oily matters, and manufacturing candles and night lights.—Sealed 17th February.

List of Patents

Granted for SCOTLAND, subsequent to January 22nd, 1847.

To Samuel Cunliffe Lister, of Manningham-house, Bradford, for improvements in preparing and combing wool.—Sealed 25th January.

Edward Cobbold, of Mullford, Sussex, for improvements in the preparation of peat, rendering it applicable to several useful purposes, particularly to fuel.—Sealed 25th January.

Matthew Gibson, of Wellington-street, Newcastle-upon-Tyne, machine-maker, for a machine for reaping, cutting grass, and other similar purposes.—Sealed 26th January.

Henry Bessemer, of Baxter House, Old St. Pancras-road, engineer, for certain improvements in the manufacture of glass, and in machinery and apparatus connected therewith, and also in silvering and coating glass; parts of which improvements are applicable to the manufacture of tinfoil and thin sheets of other metal, or alloys of metal.—Sealed 28th January.

John Thompson Carter, of Drogheda, Ireland, flax-spinner, for improvements in machinery for crushing, bruising, and preparing flax, hemp, and other fibrous materials requiring such treatment.—Sealed 29th January.

Richard Walker, of Rochdale, cotton-spinner, for certain im-

provements in the apparatus for the manufacture of gas for illumination, which said improvements are also applicable to the manufacture of other products of distillation.—Sealed 29th January.

Stephen R. Parkhurst, of Leeds, manufacturer, for improvements in rotatory engines.—Sealed 4th February.

Moses Poole, of the Bill Office, London, Gent., for improvements in the manufacture of terry and cut piled fabrics,—being a foreign communication.—Sealed 4th February.

William Nicholson, of Manchester, engineer, and George Wadsworth, of Sutton Glass Works, manager, for certain improvements in the manufacture of glass and other vitreous products.—Sealed 4th February.

Richard Albert Tilghman, of Scott's-yard, Bush-lane, London, chemist, for improvements in the manufacture of certain acids, alkalies, and alkaline salts.—Sealed 4th February.

Richard Albert Tilghman, of Scott's-yard, Bush-lane, London, chemist, for improvements in the manufacture of certain alkaline salts.—Sealed 4th February.

Egbert Hedge, of No. 7, Howard-street, St. Clement's Danes, London, for certain improvements in rails for railways, and in the manner of securing them.—Sealed 5th February.

John Donkin, of Grange-road, Bermondsey, London, civil engineer, for improvements in the manufacture of paper, or in the machinery employed therein, and in the process of bleaching paper, linen, and other manufactures in which chloride of lime is employed,—partly a foreign communication.—Sealed 8th February.

James Yates, of Masborough, Yorkshire, engineer and ironfounder, for improvements in the construction of blast furnaces.—Sealed 10th February.

Thomas Du Boulay, of Sandgate, Kent, and John Du Boulay, of Buckshaw, Dorsetshire, for improvements in fitting up granaries and warehouses, and of getting into condition and preserving therein grain, pulse, seeds, malt, and other perishable articles.—Sealed 10th February.

Enoch Wilkinson, of Oldham, overlooker, for certain improvements in looms for weaving.—Sealed 15th February.

Juan Nepomuceno Adorno, of Mexico, for improvements in manufacturing cigars and other similar articles.—Sealed 22nd February.

New Patents

SEALED IN ENGLAND.

1846-47.

To Thomas Bramwell, of Newcastle-upon-Tyne, manufacturing chemist, for improvements in furnaces and apparatus to render atmospheric air available in producing cyanides, and certain other compounds, which improvement in furnaces and apparatus may also be employed for other purposes.* Sealed 8th October, 1846—6 months for inrolment.

Thomas Barnabas Daft, of Birmingham, Gent., for improvements in constructing inkstands, and in fastenings to elastic bands. Sealed 1st February, 1847—6 months for inrolment.

Richard Albert Tilghman, of Scott's-yard, Bush-lane, in the city of London, chemist, for improvements in the manufacture of certain acids, alkalies, and alkaline salts. Sealed 1st February—6 months for inrolment.

Richard Albert Tilghman, of Scott's-yard, Bush-lane, in the city of London, chemist, for improvements in the manufacture of certain alkaline salts. Sealed 1st February—6 months for inrolment.

Edward Newman Fourdrinier, of Cheddleton, in the county of Stafford, paper manufacturer, for improvements in apparatus to be used for raising and lowering weights from mines and other places. Sealed 1st February—6 months for inrolment.

John Thompson Carter, of Drogheda, in the county of the town of Drogheda, in Ireland, flax spinner, for improvements in machinery for crushing, bruising, and preparing, flax, hemp, and other fibrous materials requiring such treatment. Sealed 1st February—6 months for inrolment.

Marco Henrij Franzoni, of Carrara, but now residing at Pelham-place, Brompton, Middlesex, sculptor, for improvements in obtaining and applying motive power. Sealed 1st February—6 months for inrolment.

Benjamin Dawson Norton, of Cranford-bridge, in the county of Middlesex, Gent., for certain improvements in cranes and other hoisting and lowering machinery. Sealed 1st February—6 months for inrolment.

* This patent having been opposed, was not sealed till the 30th January, but bears date the 8th October, 1846, by order of the Lord Chancellor.

William Pidding, of Bernard-street, Middlesex, Gent., for an improved mode of exhibiting and protecting certain colored fabrics, ornamental inscriptions, and other designs. Sealed 2nd February—6 months for inrolment.

George Grundy, of Manchester, manager, for certain improvements in furnaces, and in the flues and tiles used in the construction thereof. Sealed 8th February—6 months for inrolment.

Christopher Vaux, of Frederick-street, London, Gent., for improvements in storing and supplying beer, ale, and porter. Sealed 8th February—6 months for inrolment.

Thomas Brown Jordan, of Belvidere-road, Surrey, mechanical engineer, for certain improvements in machinery for working mouldings. Sealed 8th February—6 months for inrolment.

Thomas Du Boulay, of Sandgate, in the county of Kent, Esq., and John Du Boulay, of Buckshaw, in the county of Dorset, Esq., for improvements in fitting up granaries and warehouses, and of getting into condition and preserving therein, grain, pulse, seeds, malt, and other perishable articles. Sealed 8th February—6 months for inrolment.

William Sadler Kennedy, of Burslem, porcelain manufacturer, for improvements in attaching plain or ornamental surfaces of earthenware, china, or glass, to articles made of metal, wood, or other materials. Sealed 8th February—6 months for inrolment.

Stephen Moulton, of Norfolk-street, Strand, Middlesex, Gent., for improvements in treating caoutchouc with other materials to produce elastic and impermeable compounds,—being a communication. Sealed 8th February—6 months for inrolment.

John Loach, of Birmingham, brass-founder, for a certain improved fastening, or certain improved fastenings for windows, shutters, doors, and tables; applicable also as a fastening or fastenings generally. Sealed 8th February—6 months for inment.

Alexander Doull, of Euston-grove, Middlesex, civil engineer, for certain improvements in railway, steam-boat, and other signals. Sealed 8th February—6 months for inrolment.

Stephen Geary, of No. 10, Hamilton-place, Middlesex, civil engineer, for certain improvements in obtaining and applying motive power. Sealed 8th February—6 months for inrolment

John Gedge, of 4, Wellington-street, Strand, Middlesex, for certain improvements in the machinery or apparatus used for watering grain,—being a communication. Sealed 8th February—6 months for inrolment.

Uriah Clarke, of Leicester, dyer, and Henry Barber, of the same place, fuller and dresser, for certain improvements in the manufacture of looped and woven fabrics. Sealed 8th February —6 months for inrolment.

Enoch Wilkinson, of Oldham, in the county of Lancaster, overlooker, for certain improvements in looms for weaving. Sealed 9th February—6 months for inrolment.

William Eaton, of Camberwell, Surrey, engineer, for improvements in machinery for twisting cotton and other fibrous substances. Sealed 9th February—6 months for inrolment.

Charles Hancock, of Grosvenor-place, Middlesex, Gent., for improvements in the preparation of gutta-percha, and in the application thereof alone, and in combination with other materials to manufacturing purposes, which improvements are also applicable to other substances. Sealed 10th February—6 months for inrolment.

Alfred Brett, of Holborn-bars, Gent., and George Little, of High Holborn, electrical engineer, for improvements in electric telegraphs, and in the arrangements and apparatus to be used therein and therewith; part of which improvements are also applicable to timekeepers, and other useful purposes. Sealed 11th February—6 months for inrolment.

Egbert Hedge, residing at No. 7, Howard-street, in the parish of St. Clement's Danes, Middlesex, for certain improvements in rails for railways, and in the manner of securing them. Sealed 12th February—6 months for inrolment.

William Edward Newton, of the Office of Patents, 66, Chancery-lane, civil engineer, for improvements in aerial locomotion,—being a communication. Sealed 15th February—6 months for inrolment.

Solomon Leatham, of Leeds, overlooker in a mill, for improvements in roving and spinning flax and other fibres. Sealed 15th February—6 months for inrolment.

Nathaniel Card, of Manchester, twine manufacturer, for certain improvements in machinery or apparatus for twisting, twining, or manufacturing cords, bands, twine, and other similar articles from cotton, flax, hemp, silk, and other fibrous yarns or threads. Sealed 16th February—6 months for inrolment.

Phillip Henry Holland, of Chorlton-upon-Medlock, in the borough of Manchester, surgeon, for improvements in applying manure to land,—being a communication. Sealed 16th February—6 months for inrolment.

Robert Stirling Newall, of Gateshead, Esq., for certain improvements in locomotive engines. Sealed 16th February—6 months for inrolment.

Francis Henry Waller, of Harrington-square, Middlesex, surgeon, for improvements in apparatus for making and filtering infusions of coffee and other articles. Sealed 16th February—6 months for inrolment.

Alexander Bain, of Upper Baker-street, Middlesex, electrical engineer, for improvements in clocks and timekeepers, and in apparatus connected therewith. Sealed 19th February—6 months for inrolment.

François Stanilas Meldon De Sussex, of Millwall, Midddlesex, manufacturing chemist, for improvements in the manufacture of chlorine, hydrochloric acid, and nitric acid, and obtaining several products therefrom. Sealed 19th February—6 months for inrolment.

Joseph Clinton Robertson, of Fleet-street, civil engineer, for certain improvements in distillation and brewing, and certain applications of the materials used in or suitable therefor to other manufacturing purposes,—being a communication. Sealed 20th February—6 months for inrolment.

Edward Brown, of Adam's-court, in the city of London, Gent., for certain carbonic compounds formed of earth, vegetable, animal, and mineral rubbish, fecal substances, the waste of manufactories, and certain acids and alkalies; which compounds are applicable as manures,—being a communication. Sealed 20th February—6 months for inrolment.

William Pidding, of Bernard-street, Middlesex, Gent., for an improved process or improved processes for preparing certain vegetable extracts, and also for preserving the aroma of certain vegetable substances from the atmosphere. Sealed 24th February—6 months for inrolment.

William Bayliss, of Bilston, in the county of Stafford, chainmaker, for a machine for flattening and turning iron links for flat wood stub-chains. Sealed 24th February—6 months for inrolment.

George Russell Dartnell, a staff surgeon of the first class in Her Majesty's army, now stationed at Chatham, in the county of

Kent, for an improved truss for inguinal hernia. Sealed 24th February—2 months for inrolment.

Alphonse le Mire de Normandy, of Bethnal-green, Middlesex, analytical chemist, for improvements in the manufacture of zinc. Sealed 24th February—6 months for inrolment.

Frederick Walton, of Wolverhampton, in the county of Stafford, japanner, for an improved mode of coating or covering, or of coating, covering, and ornamenting the surfaces of articles which are or may be made of wrought iron, or of other metal or metals; which improved mode may be used in substitution of japanning, tinning, or other modes now in common use, of coating, covering, or of coating, covering, and ornamenting such articles. Sealed 24th February—6 months for inrolment.

Juan Nepomuceno Adorno, of Mexico, in the Republic of Mexico, Gent., for improvements in manufacturing cigars, and other similar articles. Sealed 24th February—6 months for inrolment.

John Lowe, of Manchester, civil engineer, and James Simpson, of the same place, joiner, for certain improvements applicable to carriages to be used upon railways, part of which improvements may also be used upon other roads. Sealed 24th February—6 months for inrolment.

William Todd, of Holcombe Brook, near Bury, in the county of Lancaster, for certain improvements in the method of sizing and dressing yarns, and in the machinery or apparatus for performing the same. Sealed 24th February—6 months for inrolment.

Frederick Ransome, of Ipswich, engineer, for improvements in working coke and other kilns, or ovens. Sealed 24th February —6 months for inrolment.

Charles Heard Wild, of Mortimer-street, Cavendish-square, Middlesex, civil engineer, for improvements in constructing parts of railways. Sealed 24th February—6 months for inrolment.

Charles Fox, of London Works, Birmingham, for a method, or methods, of welding or uniting pieces of metal together, and of pressing or forming pieces of metal into forms or shapes. Sealed 24th February—6 months for inrolment.

Robert Snowden, of No. 7, City-road, Middlesex, tea dealer, for improvements in treating or dressing coffee, to render it more wholesome for use. Sealed 24th February—6 months for inrolment.

CELESTIAL PHENOMENA FOR MARCH, 1847.

D.	H.	M.	
1			Clock before the ☉ 12m. 40s.
			☽ rises 5h. 23m. A.
			☽ passes mer. Morn.
			☽ sets 6h. 8m. M.
2	2		☽ in Apogee
2	3	9	Ecliptic oppo. or ○ full moon.
	—		Occul. υ Leonis, im. 14h. 57m. em. 16h. 10m.
4	3	38	☿ in the ascending node
5			Clock before the sun, 11m. 48s.
	—		☽ rises 9h. 34m. A.
	—		☽ passes mer. 2h. 10m. M.
	—		☽ sets 7h. 40m. M.
	7	59	♃'s second sat. will em.
6			Ceres in the ascending node
	7	41	♃'s first sat. will em.
7			Occul. ζ1 Libra, im. 11h. 22m. em. 12h. 24m.
	—		Occul. ζ3 Libra, im. 12h. 40m. em. 13h. 26m.
	—		Occul. ζ4 Libra, im. 13h. 34m. em. 15h. 4m.
8	17	13	☿ in Perihelion
	—		Occul. x Ophiuchi, im. 15h. 14m. em. 15h. 31m.
10			Clock before the sun, 10m. 35s.
	—		☽ rises 1h. 40m. M.
	—		☽ passes mer. 6h. 8m. M.
	—		☽ sets 10h. 35m. M.
	4	39	☽ in □ or last quarter
11			Occul. ρ1 Sagittarii, im. 17h. 56m. em. 19h. 8m.
12	3	14	♂ in conj. with the ☽ diff. of dec. 0. 14. S.
	10	35	♃'s second sat. will em.
	17	42	♀ in conj. with ♅ diff. of dec. 0. 14. S.
13	9	37	♃'s first sat. will em.
13	22	17	☿ greatest elong. 18. 18. E.
15			Clock before the sun, 9m. 13s.
	—		☽ rises 5h. 17m. M.
	—		☽ passes mer. 10h. 48m. M.
	—		☽ sets 4h. 30m. A.
	5	7	♄ in conj. with the ☽ diff. of dec. 5. 20. S.
16	9	11	Ecliptic conj. or ● new moon
	—		☽ in Perigee
17	13	12	☿ in conj. with the ☽ diff. of dec. 2. 29. N.
		44	♅ in conj. with the ☽ diff. of dec. 1. 12. S.
	23	9	♀ in conj. with the ☽ diff. of dec. 0. 39. S.
18			Mercury R. A. 0h. 49m. dec. 8. 23. N.
	—		Venus R. A. 1h. 12m. dec. 6. 58. N.
	—		Mars R. A. 19h. 50m. dec. 21. 52. S.
	—		Vesta R. A. 13h. 21m. dec 4. 44. N.

D.	H.	M.	
—			Juno R. A. 19h. 2m. dec. 10. 18. S.
—			Pallas R. A. 2h. 10m. dec. 8. 37. S.
—			Ceres R. A. 4h. 5m. dec. 21. 20. N.
—			Jupiter R. A. 4h. 33m. dec. 21. 33. N.
—			Saturn R. A. 22h. 34m. dec. 10. 38. S.
—			Georg. R. A. 0h. 49m. dec. 4. 39. N.
—			Mercury passes mer. 1h. 7m.
—			Venus passes mer. 1h. 30m.
—			Mars passes mer. 20h. 8m.
—			Jupiter passes mer. 4h. 50m.
—			Saturn passes mer. 22h. 49m.
—			Georg. passes mer. 1. 7.
	14	2	☿ in conj. with ♅ diff. of dec. 3. 54. N.
19	0	58	☿ greatest hel. lat. N.
	—		Occul. υ Arietis, im. 7h. 39m.
20			Clock before the sun 7m. 45s.
	—		☽ rises 7h. 58m. M.
	—		☽ passes mer. 3h. 28m. A.
	—		☽ sets 11h. 7m. A.
	11	33	♃'s first sat. will em.
	17	33	☉ enters Aries,—spring commences
21	6	34	☿ stationary
21	12	8	♃ in conj. with the ☽ diff. of dec. 3. 45. N.
22			Occul. 115 Tauri, im. 6h. 33m. em. 7h. 41m.
23	3	15	☿ in conj. with ♅ diff. of dec. 4. 23. N.
	5	41	☽ in □ or first quarter
24			Occul. λ Geminorum, im. 8h. 46m. em. 9h. 33m.
25			Clock before the sun 6m. 14s.
	—		☽ rises 0h. 10m. A.
	—		☽ passes mer. 7h. 47m. A.
	—		☽ sets 2h. 41m. M.
26			Occul. α1 Cancri, im. 7h. 41m. em. 9h. 2m.
	—		Occul. λ Cancri, im. 15h. 4m. em. 15h. 58m.
29	6		☽ in Apogee
	7	58	♃'s first sat. will em.
30			Clock before the ☉ 4m. 41s.
	—		☽ rises 5h. 20m. A
	—		☾ passes mer. 11h. 25m. A.
	—		☽ sets 4h. 59m. M.
31	7	52	☿ in inf. conj. with the ☉
	—		Partial Eclipse of the ☽
	6	27	First contact with Penumbra
	8	3	First contact with Shadow
	9	6	Middle of the Eclipse
	10	9	Last contact with Shadow
	11	45	Last contact with Penumbra
	9	37	Ecliptic oppo. or ○ full moon

J. LEWTHWAITE, Rotherhithe.

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No. CLXXXIV.

RECENT PATENTS.

To JOHN SPENCELEY, *of Whitstable, in the county of Kent, master block-maker, for improvements in the construction of ships and other vessels; and also improvements in apparatus to be attached to ships and other vessels.*—[Sealed 20th January, 1846.]

THIS invention consists, in the first place, in the application of strengthening stays or braces, whereby the parts of the hull of a ship or vessel, or some of the principal timbers composing the same, are braced or held together, and the whole fabric is rendered more rigid than when constructed in the ordinary manner. This part of the invention will be found more particularly useful for strengthening vessels employed for carrying loose cargoes, such as coals, stone, sand, iron, and similar materials; and also for ships of war, where great rigidity and strength are required.

The second part of the invention refers to the construction and employment of an apparatus whereby the lee-way that a ship makes, when sailing with a side wind, may be ascertained with greater certainty than by the means now in use for that

purpose. The invention consists, thirdly, in various improvements applicable to ships' pumps, or the means of working the same. The fourth part consists in improved ships' windlasses. Lastly, the invention relates to the heaving in and out of the bowsprit of vessels, whereby this operation may be effected in less time than by the ordinary means, and with much greater facility.

In Plate VIII., fig. 1, represents, in longitudinal section, a large schooner or brig, with some of the improvements applied thereto; and fig. 2, is a horizontal sectional view of the same, as seen when looking upward from below. The hull of the vessel is constructed in the ordinary manner, and the arrangement or disposition of the timbers or framing, as generally adopted, is here preserved; the inventor's object being merely to impart additional strength and rigidity to the keel and deck-framing. For this purpose, stays or braces and supports are employed, whereby the keel or kelson and the deck-timber may be firmly braced together, so as to prevent either from yielding or giving way when exposed to any additional or accidental strain. *a, a, a,* is the kelson, to which the saddle or joint-pieces *b, b,* at the lower end of the inclined stays or braces *c, c,* are firmly attached, by means of screw-bolts, as shewn in the drawing. As the braces *c, c,* which are composed either of single rods, chains, or wire ropes, are in the line of the keel, and therefore, if carried upwards in an inclined direction, would interfere with the masts, they are furnished with a strong cross-head at their upper end, as represented at *d,* in fig. 2; and two strong wrought-iron rods, chains, or wire ropes *e, e,* are passed, one on each side of the mast, up to the deck-beams or timbers *f, f,* which are furnished with strong iron plates *g, g,* to receive the heads of the iron rods *e, e,* and distribute the strain. The lower end of these rods *e, e,* which pass through the cross-head *d,* are each furnished with a screw-thread and nut, in order that the rods may be brought to any desired tension. It will be seen that the inclined brace at the other end of the vessel, is constructed and applied in a precisely similar manner; and, therefore, the description of one will apply equally to both; but this brace is inclined in the opposite direction, so that the braces are pulling against

each other. In order to transfer a portion of the strain from the two deck-beams or timbers *f, f,* to some of those behind, such as at *h, h,* horizontal wooden or metal stays *i, i,* are placed angularly at the back of the timbers *f, f,* as shewn in the drawing; and the more effectually to prevent the beams *f, f,* and *h, h,* from being pulled asunder or displaced by the tension of the inclined braces *e, e,* long horizontal tension-rods *j, j,* of wrought-iron, are passed through these timbers or beams, and one end of the rods being furnished with a screw and nut, they may be screwed up as tight as is necessary, and whenever it may be required. The horizontal deck-beams or timbers *f, f,* are supported vertically by cast-iron or wooden pillars *k, k,* which are firmly secured below to the kelson, and at top to the under side of the deck-timbers *f, f,* as shewn in fig. 1. By this means an equal strain is distributed throughout the entire length of the kelson, which is effectually prevented from "hogging" or bending in the middle.

Fig. 3, represents a longitudinal vertical section of a steam vessel, with the improved strengthening braces applied thereto. In this instance, double braces are employed; and others may, if necessary, be applied to the sleepers under the engine; but they are constructed in precisely the same manner as those above described, with the exception of having an additional tension-rod *j*, j*,* to assist in supporting the weight of the engine and boiler. As similar letters of reference are placed upon corresponding parts in all the figures, it will only be necessary further to say, that by employing double braces or two sets, as shewn in the drawing, and also horizontal stays, extending from the fore to the after part of the deck, to prevent these parts from collapsing or being drawn together by the tension of the braces, a double-acting brace is produced, which will have a double effect.

The improved apparatus for ascertaining and indicating the lee-way made by a ship when sailing with a side wind, or lying to, is shewn in fig. 1. It consists of a vane or tail, jointed to the end of a rod, which is lowered down through a hole made in the "garboard streak" or keel for that pur-

pose. *l*, is the vane or tail, which consists of two thin flat and straight blades or pieces of wood, or hollow copper vessels, connected to the lower end of the vertical rod *m, m*, by means of a square or stop-joint, which will allow the blades of the tail to stand out horizontally, and at right angles to the rod *m*, as seen in the figure. The blades should be made either of wood or of some light material which will float in water; so that when the vane or tail and lower end of the rod *m*, is lowered down below the keel, the buoyancy of the water will cause the tail to rise up into the position shewn in the drawing, and at right angles to the rod *m*, which is enclosed in a water-tight tube or casing, extending from the keel or garboard streak up to the deck, and therefore prevents any water from entering the vessel through the hole which is made in the keel or garboard streak to permit the rod *m*, to pass through. The rod *m*, carries two double collars *n, n*, one of which is shewn by dots in the figure, for the purpose of making it work or move steadily in the tube; and the collars *n, n*, are furnished with small antifriction rollers, to prevent them from rubbing against the sides, or sticking in the tube. At the upper end of the tube, and on the deck of the vessel, a graduated dial-plate or compass-card *o, o*, (see the detached view, fig. 4,) is fixed. The rod *m*, carries an index *p*, at its upper end, and as it moves round with the rod *m*, the index points to the graduations on the compass-plate *o*. When the apparatus is not in use, the rod *m*, is drawn up, so as to draw the vane *l*, into the tube, or it may be entirely removed, which can easily be done, as the blades are jointed to the rod *m*, and will therefore admit of being folded back into a line with the rod, as shewn by dots in fig. 1. When, on the contrary, the apparatus is to be used, the vane is lowered into the water, when it will, as above mentioned, float; the light blades which form the vane *l*, and the current of water under the ship, will act upon them precisely in the same manner as the wind acts upon an ordinary weathercock, and will turn the vane round until it is in a line with the course of the ship; then, by examining the graduated indicator above, the observer will be able at once, and with great exactness, to see whether the ship is making any lee-

way; and he will, at one view, be able to ascertain the number of points or degrees of lee-way the ship makes, and correct her course accordingly.

At fig. 4, the tail or vane *l*, is represented in the position it would assume when the ship is running her proper course, and making no lee-way; but, immediately she begins drifting to leeward, the vane *l*, will instantly indicate it by moving round in obedience to the current, and assuming some such position as is shewn by dots at *l**, in the figure.

The third improvement consists in constructing and working ships' pumps in such a manner that they may be made to pump water from the hold or well of a ship without the assistance of manual labour, but simply by the power of the wind. This part of the invention is also shewn in fig. 1, in which *q*, *q*, represents the barrel and trunk of a ship's pump, the lower end of which is open to the well of the ship. The internal arrangement of the parts is nearly the same as that generally adopted, the principal improvement relating simply to the mode of working the pump. *r*, is the pump-rod, to the lower end of which the piston is attached, as usual; and the upper end of the rod *r*, is connected to the crank of a horizontal shaft *t*, which turns in bearings made in the bracket-piece *u*, *u*. The outer end of the shaft *t*, carries a fan *v*, consisting of four blades or sails, which, when acted upon by the wind, will be made to revolve and work the crank at the opposite end of the shaft *t*. In order that the wind may be made to actuate the fan or windmill from whatever direction it blows, the bracket *u*, *u*, is connected to a moveable ring or circular piece of metal *w*, which surrounds the upper part of the barrel or trunk of the pump; and as the ring *w*, is made moveable, so that it may be turned round, the bracket-piece *u*, with the fan and horizontal shaft *t*, may all be moved round the pump-rod *r*, as the centre (according to the direction of the wind), and brought into the required position; the ring *w*, is then properly secured and prevented from moving by means of a wedge *s*, as shewn in the drawing. For the convenience of stowage, the blades or sails *v*, *v*, are made moveable, to allow of their being taken out of the boss and removed, when not required for use.

The fourth part of the invention, namely, improvements in ships' windlasses, is shewn at figs. 5, and 6; of which fig. 5, represents a transverse vertical section, and fig. 6, a plan or bird's-eye view, as seen from above. The improvement consists in mounting a toothed-wheel *s*, on the barrel of the windlass, contiguous to the ordinary ratchet-wheel, and working the said wheel *s*, by means of palls or short levers *x*, *x*, connected at their opposite ends to a large bent double hand-lever *y*, *y*, which has its centre of motion at 1. The ordinary ratchet-wheel is seen at *z*; and 2, 2, are the clicks or palls, which prevent the barrel from turning in the wrong direction. As one of the short levers *x*, is on one side of the centre 1, of the bent double-lever *y*, and the other lever *x*, on the opposite side, it will be evident that, when either end of the double hand-lever *y*, is depressed, it will drive round the toothed-wheel *s*, two teeth; and that, by alternately raising and depressing the said double hand-lever, a continuous rotary motion will be communicated to the barrel of the windlass.

The last part of the invention consists in an improved mode of heaving in and out the bowsprit of a vessel. Fig. 7, represents, in longitudinal elevation, part of a mounted bowsprit, with an iron rack (which may be applied to the upper or under side) attached to the inner end of the bowsprit, and a strong pinion *z*, in gear with the rack. The axle or shaft of the pinion *z*, is furnished with cranks or winch-handles, by means of which the pinion is actuated when the bowsprit is required to be heaved in or out. In order to prevent too great a strain from being thrown on to the pinion when the bowsprit is out, two small antifriction rollers 3, 3, are placed on the axle of the pinion, which, by running on the top of the bowsprit, and on each side of the rack, prevent the teeth of the pinion from being strained or worn unequally.

The patentee claims, First,—the method herein shewn and described of strengthening ships or vessels. Secondly,—the employment of an apparatus as above shewn, or any modification thereof, for ascertaining and indicating the amount of lee-way made by a ship under certain circumstances. Thirdly, —the method, above described, of constructing a self-acting ship's pump, by the application to a ship's pump of a fan or

sails, acted upon by the wind. Fourthly,—the improved mode of constructing and working windlasses, as above described; and, Lastly,—heaving in or out the running bowsprits of cutters, yachts, and other vessels, by means of a rack and pinion motion, as above described.—[*Inrolled in the Petty Bag Office, July,* 1846.]

To Henry Parry, *of High-street, Deptford, in the county of Kent, Gent., for certain improvements in the manufacture of hats.*—[Sealed 20th August, 1846.]

The novelty of this invention consists in making hats so that they will present the appearance of being partially covered with crape, cloth, or other material, as worn by persons in mourning. This is effected by covering parts only of the outer surface of the hat with nap; and if the hats so manufactured are white, or any color, excepting black, the portion which is not covered with nap is printed or colored black. The hats may be made with felted stuff-bodies, or any other description of hat-bodies; and any of the ordinary materials for forming the nap may be employed. If preferred, the whole outer surface of the hat-body may be covered with the material of which the nap is to be formed; and such material, or the nap thereof may be afterwards cut, burnt, or otherwise removed from the parts to be left bare or without nap; or after the body has been covered with such material, the nap may be raised on those parts only which are required to possess a nap.

When the hat is to be made with a felted stuff-body, and waterproofed in the usual way, the patentee covers, with the material for forming the nap, so much of the tip or apex of the body as is requisite, in order that the hat may be made with a nap upon the crown, and so much of the side or side-crown as may be desired; he also applies the material to the exterior and interior of the part of which the brim is to be made, so that the brim may possess a nap on both sides, as usual; and the part which is to form the side, or a portion of the side of the hat, is left uncovered. The hat-body, thus

prepared, is blocked, its nap raised, and (if desired) shorn, and the whole dyed in the ordinary way; after which, it is finished, trimmed, and shaped as usual. If the edges of the napped portions of the hat should happen to be irregular, the superfluous parts may be burnt off by the flame of a lamp; the edges of those portions of the nap which are not to be removed being kept moist or otherwise protected from the action of the flame. Hats made in the above manner may have only part of the side uncovered or devoid of nap, or the whole or nearly the whole side of the hat may be without nap. The appearance of that portion of a felted hat-body which is not covered with nap may be improved by putting a thin cover or band of finer material (such as beaver, neutria, musquash, or hares' wool) upon it, towards the close of the felting process, and before the body is waterproofed; and its appearance may be further improved by rubbing with glass-paper before it is dyed, so as to smooth it and remove superfluous hairs and particles.

If a hat is to be faced with silk, the patentee covers the crown, brim, and so much of the side as may be required to have a nap, with plush or other material of which the nap is to be formed; and the other part of the side is covered with black cloth or other material without nap. The edges of the plush and cloth must be perfectly even, and they should be sewn or otherwise fastened together all round the hat; after which the hat is finished in the usual way. Hats may likewise be covered with silk or other suitable material which has a plush or napped face formed on a part only of the fabric.

The side of a felted stuff hat may be stamped, crimped, or impressed in such a manner that it will present an appearance similar to crape.

The patentee claims the manufacturing of hats, partly covered with nap and partly uncovered, as above described.—[*Inrolled in the Inrolment Office, February,* 1847.]

To Henry Constantine Jennings, *of Cumberland-terrace, Regent's-park, in the county of Middlesex, practical chemist, for a new method or apparatus or machine, for the better or more economic evaporation of fluids or liquids containing crystalline or other matters to be concentrated or crystallized.*—[Sealed 11th August, 1846.]

This invention consists in obtaining a great evaporating surface by elevating a column of liquid, containing sugar, salt, or other saline substance or matter to be evaporated and crystallized, and causing the same to circulate over a certain number of double cylinders, heated by steam or hot-air; the elevation and circulation of the liquid being produced by the injection into the evaporating apparatus of atmospheric air, either heated or cold.

In Plate VIII., fig. 1, is a vertical section of the apparatus employed by the patentee for carrying out his invention; fig. 2, is a horizontal section on the line 1, 2, of fig. 1; fig. 3, is a plan view of the double cylinders; fig. 4, a plan view of a tray, which is placed above them; and fig. 5, is a plan view of a cap or head and distributing pipes, belonging to the tray. A, is a wooden vat or back, about 5 feet high, and 4½ feet in diameter, containing a pan B, C, which is supported about 6 inches from the bottom by radiating metal bands or supports, so as to rest solidly upon the bottom of the vat. This pan is 4 or 5 inches less in diameter than the vat, so that steam can pass freely around and under the lower part B, of the pan; and it has a partition fixed about two feet from its bottom, so as to constitute a kind of second bottom, from which rises a circular rim, reaching to the top of the vat, and fastened thereto by screws and cement, applied in such a manner as to form an air and steam-tight joint. In the partition or second bottom three holes E, 6 inches in diameter, are formed; these holes are furnished with valves, opening downwards, and suspended by hinge-joints: a tendency to close is given to each valve by a counterpoise weight and lever, as shewn in fig. 1; and each valve is also furnished with a hollow copper ball, which will cause the valve to close when the liquid in the compartment B, rises up to the ball; but

when the compartment B, is empty, or nearly empty, the weight of the copper ball causes the valve to remain open. D, is an upright copper tube, 4 inches in diameter and 8 feet high, the lower end of which rests on a wire grating, over a cup or cavity *a*, in the bottom of the pan B, C, and it rises through the centre of the partition or second bottom to a height of 6 feet above it. The partition supports, at an elevation of about 2 feet 6 inches above it, or about level with the top of the vat, five hollow double cylinders of copper or other metal F, F, placed one within the other, and having their upper and under edges hermetically closed, so as to be air and steam-tight; these double cylinders are nearly 3 feet high, and about 4 inches asunder; the outer and inner surfaces of the cylinders constituting each double cylinder, being about one inch and a half apart. The upper edges of all the double cylinders are level; but the innermost of the double cylinders is about one quarter of an inch shorter than the second, and the second one quarter of an inch shorter than the third, and so on, in order that the water arising from the condensation of the steam in the double cylinders may pass from one into the other, and down the perpendicular pipes *b*, *b*, into the annular tube S, and thence through the pipe Q, into a tank, from which it is pumped into the boiler. The double cylinders are connected by union-joints, of which those marked K, K, are for the purpose of conducting the steam from the upper part of one double cylinder into the upper part of another; those marked K^1, K^1, are "dumb union-joints," and those marked K^2, K^2, are for permitting the condensed water to flow to the pipes *b*, *b*. Between the two surfaces constituting each double cylinder, straps of copper or iron are placed, to prevent the collapse which might occur if a too rapid condensation took place at any time within the cylinders, by too suddenly cutting off the steam, or from any other cause. The cylinders are supported by copper feet M, resting on the partition or second bottom, and also by three brackets U, U, soldered to the tube D; and the partition is prevented from yielding to the weight of the cylinders by tubes *d*, *d*, which, by means of the nuts screwed on their ends, form stays to the top and bottom of the compartment B. P,

is a pipe for conducting steam from the boiler into the vat; and L, is a pipe to convey the steam from the vat to the lower part of the innermost double cylinder, from which it passes through the union-joint at the top, into the second double cylinder, and so on into all the others; the uncondensed portion escaping at the pipe X. R, is a pipe for conveying the condensed water from the vat into the tank, which receives the condensed water from the pipe Q. T, is a pipe leading from a pneumatic forcing pump, and communicating with the compartment B, by the pipe O, which is used for drawing off the syrup or other liquid, after being operated upon.

Over the cylinders F, F, is a circular moveable pan or tray H, which is provided with circular divisions of wire gauze, protected by strong wires radiating from the centre of the tray, so as to cross the edges of the five double cylinders F, which have a strong copper wire, about one-eighth of an inch in diameter, running round the top of each, for the purpose of distributing the syrup, cane-juice, or other liquid, so that it may fall down the surfaces of the said cylinders, and thereby insure the equal distribution of the liquid to absorb the caloric furnished by the steam or hot air (if hot air be used instead of steam). Those parts of the tray which are over the spaces between the sets of double cylinders, and between the inner cylinder of the innermost set and the tube D, are covered with copper plates, to the edges of which the wire gauze and radiating wires are soldered; in each of these copper plates are fixed six conical tubes I, about one foot high, through which the vapour, formed by the liquid falling over the heated surfaces, escapes into the atmosphere. These tubes are provided with a flannel covering or filter, which also covers the bottom of the tray, for the purpose of filtering the cane-juice or other liquid; and the tray may be provided with animal charcoal to discharge the color of the liquid. The tray is furnished with a moveable cap or head G, which is held down by a pin *c*, traversing the tube that connects it with the tray and tube D; and to the cap or head twelve descending curved tubes V, V, are fixed, for distributing the liquid over the tray,—the openings at their lower ends are one inch and a half in diameter.

The compartment B, of the pan B, C, may contain a galvanic pile or battery of three elements, composed of copper and zinc; the first element should be 20 inches in diameter, each metal being half an inch apart, the second 16 inches, &c., the third 12 inches, &c.; and the battery should be supported upon a wooden frame, to partially insulate it from the metal bottom of the pan B, C. The copper part of each element should be about 6 inches high, and $\frac{1}{16}$ of an inch thick; and the zinc circles should be of the same height, but six or eight times thicker, united by copper straps, rivetted only, without soldering.

The mode of operating with this machine is as follows:—A given quantity, say 250 gallons of cane-juice, dissolved sugar, or other liquid, is discharged from the spout Z, into the upper part C, of the pan, when it descends, through the openings in the partition or bottom thereof, into the compartment B. Steam, at a pressure of about 2 lbs. to the square inch above the atmospheric pressure, is turned on from the boiler, and, passing through the pipe P, communicates its heat to the liquid; and, when the liquid attains the temperature of 212° Fahr., ascends through the pipe L, and fills the double cylinders F, F; the surplus passing into the atmosphere by the pipe X. The force-pump is then set to work to inject about 50 or 60 cubic feet of cold or heated air per minute into the compartment B; this air forces the liquid to rise up the tube D, into the head G, from which it descends through the curved pipes V, V, into the tray H, and thence passes down over the inner and outer surfaces of the double cylinders F, F, into the upper part C, of the pan. When all the liquid has ascended the tube D, the air that produced this effect rushes up the tube D, and escapes by the cap or head W, which is secured to the head G, by strong copper straps; and the moment this escape of air takes place, the valves E, open, and the liquid descends into the compartment B. The pan B, being again full (the requisite quantity of syrup to fill it having been admitted as before), the valves close, and the liquid again ascends, so that a continuous circulation of the liquid is obtained. As soon as the liquid is sufficiently concentrated, it is drawn off into the coolers by

means of the pipe o. The action of the force-pump must be continuous, until the requisite degree of concentration has been obtained.

The patentee claims the evaporation and concentration of liquids, in the manner and by the use of an apparatus constructed and arranged as above described; and he also claims the application of electricity to facilitate evaporation in the concentration and crystallization of liquids, as above described. —[*Inrolled in the Rolls Chapel Office, February,* 1847.]

To William Watson Pattinson, *of Felling, near Gateshead, in the county of Durham, manufacturing chemist, for improvements in the manufacture of chlorine.*—[Sealed 14th July, 1846.]

The object of this invention is to obtain a larger product than ordinary from the usual mixture of muriatic acid and oxide of manganese; which improvement the patentee proposes to realize by introducing a jet of steam into the vessel containing the mixture at a certain stage of the process.

According to the usual mode of manufacturing chlorine, as hitherto practised by the patentee and other manufacturers, a stone vessel or still, surrounded by an iron steam-case or jacket, is employed; this vessel is represented in plan view at fig. 1, and in section at fig. 2, Plate IX., but without the steam-jacket. *a*, is the stone vessel; and *b*, is a shelf or false bottom of stone, supported, at from five to ten inches above the bottom of the vessel, by pieces of stone *c, c*. *d*, is an opening for introducing the muriatic acid; *e*, is another opening, through which the quantity of acid that has been poured in may be gauged; and *f*, is the pipe through which the chlorine passes off to the receiving chamber. *g*, is a stone pipe, applied to the vessel *a*, by the patentee, for the purpose of admitting steam into it as, above mentioned.

Now, according to the present method of proceeding, the oxide of manganese, in a state of powder, is deposited on the shelf *b*, muriatic acid of sp. gr. 1·160, or 32° Twaddle, is introduced through the opening *d*, and steam is then admitted

into the steam-jacket, and allowed to act for from thirty-six to forty-eight hours; during which time the contents of the vessel become heated, and much chlorine is evolved,—the temperature of the materials seldom rising higher than 180° Fahr.;—by this process, however, much less than the proper quantity of chlorine, which the materials used ought to produce, is given off. In carrying out his invention, the patentee charges the vessel *a*, with muriatic acid and oxide of manganese, in lumps, and steam is admitted into the iron case, as usual, until the materials have reached the highest degree of temperature obtainable by these means (about 180° Fahr.), which will be in about eighteen hours; and by this time a large quantity of chlorine will have been evolved. Steam, at a pressure of 10 lbs. to the square inch, or higher, is then admitted into the vessel *a*, through the pipe *g*, in order to increase the temperature of the materials to from 212° to 220° Fahr., and thereby expel nearly the whole of the remaining chlorine. The steam is not allowed to flow in continuously, but is admitted for half an hour, and then shut off for a like period, until the increased temperature, above-mentioned, is obtained, which will take about six hours; the whole or nearly the whole of the chlorine having then been expelled, the muriate of manganese is removed from the vessel, and a fresh charge introduced.

The employment of a jet of steam not only increases the product and expedites the process, but also renders unnecessary the grinding of the manganese, or the agitation of the contents of the vessel *a*, by mechanical means, as frequently practised; for the steam produces an agitation that frees the lumps of manganese from any sediment that may have formed upon them, and thus continually renews the surface to be acted on by the acid. The steam should not be admitted into the vessel until its contents have reached 180° or thereabouts, as otherwise a large quantity of steam might be condensed in the vessel, and the strength of the acid thereby reduced, so as to occasion a great loss, and likewise danger, from the formation of explosive combinations of chlorine and oxygen; for these reasons also, steam at a pressure of 10 lbs. to the square inch, or even more, should be used, by which

the requisite heat can be obtained with the least condensation. The chlorine given off at the increased temperature is more liable to be mixed with steam than that evolved at a low temperature; it is therefore requisite, when making bleaching powder, to dry the chlorine carefully: this may be done by causing the chlorine to pass through a pipe containing pieces of coke, amongst which sulphuric acid is allowed to flow from time to time.

The patentee claims the use of steam, within a still or vessel containing muriatic acid and oxide of manganese, for the production of chlorine, after the same shall have been heated up to a high temperature by the application of heat externally, either by steam or otherwise.—[*Inrolled in the Inrolment Office, January*, 1847.]

To WILLIAM UNSWORTH, *of Derby, silk manufacturer, for certain improvements in looms for weaving.*—[Sealed 25th March, 1846.]

THIS invention of improvements in looms for weaving relates to such looms as are employed for making ribbons or fabrics of narrow breadth, and consists in certain novel modes of arranging and working the shuttles, whereby a greater number of pieces may be woven, within a given width, than in looms of the ordinary construction.

In Plate IX., various modes of carrying out the object of this invention are shewn. The first plan, which is shewn at figs. 1, 2, 3, and 4, consists in working the shuttles by means of catches or bent arms, attached to two sliding-bars. Figs. 1, and 2, represent front and end elevations of the loom; and figs. 3, and 4, are detached views of the novel parts, drawn upon an enlarged scale, in order that the action, construction, and mode of working these parts may be more clearly seen and understood. A, and B, are two sliding-bars, mounted in bearings or guides, affixed to the frame-work of the loom in front of the batten. On the upper side of the lower bar, and on the under side of the upper bar, are fastened, by bolts, or in any convenient manner, a series of flat hook-

shaped pieces *a*, and *b*, made of thin iron, so that they may readily enter narrow slits or openings made in the back of the shuttle, for the purpose of receiving them, as shewn by dots in the plan view of the shuttle, fig. 4. The sliding-bars A, and B, are connected together at one end by a link *c*, (see fig. 1,) which turns on a fixed centre. The opposite end of one of the sliding-rods is connected to the upper end of an upright lever *d*, which vibrates on a fixed pin *f*, and carries, at its lower end, a bowl, that runs in an excentric groove made in the cam-wheel *e*. This wheel *e*, which is shewn detached, and upon an enlarged scale, at fig. 5, is actuated in any convenient manner by suitable gearing, connected with the main or driving-shaft, as shewn at figs. 1, and 2; but, as the means of actuating this wheel forms no part of the invention, and must be varied according to circumstances, it will be unnecessary to give any further or more detailed explanation thereof. As the wheel *e*, revolves, the excentric groove on its face causes the lever *d*, to move back into the position shewn by dots in fig. 1; and, by the connection of this lever with the sliding-rods A, and B, one of these rods will be moved laterally in one direction, and the other in the opposite direction simultaneously. It will now be seen that, as the shuttles are suspended alternately on the horizontal parts of one of the sets of hook-shaped pieces or bent arms *a*, or *b*, by the movement of one of the sliding-rods (say the rod A, for example) the whole set of shuttles will be moved laterally. This motion will carry the shuttles only half way through the shed; it will therefore be necessary to complete the shoot, which is effected by the set of hook-shaped pieces on the other sliding-rod B, entering the slits in the opposite end of the shuttles. It should be observed, that the shuttles are not only suspended upon or supported by the horizontal part of the hook-shaped pieces or bent arms *a*, and *b*, alternately, but are further secured or held there (until they are required to be removed) by means of catches at the ends of the bent levers *a**, and *b**, which take into holes or catch against studs or projections made in the shuttle for that purpose. These bent arms *a**, and *b**, are mounted upon studs, attached to the fixed bent arms or hook-pieces *a*,

and *b*, and are capable of rocking thereon; their opposite ends are furnished with studs, which enter the notches of a second pair of sliding-bars A*, and B*, actuated in a manner similar to that described in reference to the other bars A, and B, but by means of a different cam or excentric. After the horizontal part of the hook-pieces belonging to the sliding-bar A, is inserted into one end of the shuttle, a lateral motion is given to the sliding-bars A*, and B*, and the catch at the end of the bent lever *a**, is thereby made to catch against the notch or pin of the shuttle, which cannot be released until the catch is lifted up, on the motion of the bar A*, being reversed. As the two bars A*, and B*, are connected together at their ends by a link, similar to *c*, they are made to move simultaneously, so that at the time the catch of the bent lever *a**, lays hold of the shuttle, the catch of the bent lever *b**, quits its hold and allows the shuttle to be removed.

At fig. 3, the bars A, A*, are shewn in the position they would assume when the catch of the bent lever *a**, has firm hold of the shuttle, and has carried it half way through the shed, as above mentioned, and just previous to the bent lever *b**, quitting its hold of the shuttle. The hook-shaped piece of the bar B, and the bent lever of the bar B*, will also, at the same time, have been advanced, as seen in the figures, ready to take the shuttle and carry it the remaining portion of the shoot; and upon the catch of the bent lever *a**, quitting its hold, and that of the bent lever *b**, taking hold of the shuttle, the hook-shaped arm *b*, will be withdrawn, and carry the shuttle with it through the remaining portion of its course. It must be understood, that as the two sliding-bars A, and B, are connected together by a link *c*, as above described, the motions of the two bars are simultaneous; that is to say, as the bar A, carries the shuttles in on the hook-shaped pieces *a*, the corresponding pieces *b*, of the bar B, advance to receive them, and both bars recede simultaneously; and after the weft laid in by the shuttles has been beaten up by the batten, the two bars A, and B, again advance simultaneously, and again transfer the shuttles from one to the other, and so on until the whole length of fabric is completed.

Sometimes, in lieu of shuttles, the patentee employs car-

riers to pass the weft through the shed, in which case the shuttles are entirely dispensed with. In the drawings accompanying his specification, the patentee has shewn various ways in which this object may be effected; but as the arrangement of the bobbins, which carry the weft-threads, is very similar in all the various plans, it would be an useless recapitulation to describe and shew this part of the apparatus to more than one arrangement; the only difference in the plans being in the mode of carrying the thread from side to side of the fabric, and holding it while the batten beats up.

Fig. 6, represents a front elevation of part of a loom, shewing one mode of dispensing with the shuttles, and using a double set of weft-carriers and points in lieu thereof. In this instance, as well as in all the others in which carriers are employed in lieu of shuttles, the weft-bobbins are placed at the back part of the loom behind the harness, as shewn in fig. 7, which is a plan view of another arrrangement, hereafter described. From the bobbins, behind the harness, the weft passes through the harness to the reed, and through the reed to a notch or slot at the end of the weft-carriers. If a selvage is to be made on both sides of the ribbon, then two sets of carriers and two bobbins must be employed for each piece of goods, as shewn in the figures; but if a selvage is only required on one side, then but one carrier and one bobbin need be used. The weft-carriers are bent arms or hook-shaped pieces *a*, and *b*, bolted or otherwise secured to the sliding-bars A, and B, and are actuated in a somewhat similar manner to the bars above described, in reference to figs. 1, 2, 3, and 4; but, in the present instance, the bars A, and B, are moved alternately, and not simultaneously; that is to say, each bar, with its carriers, is alternately moved laterally in the following manner:—The sliding-bar A, with its weft-carriers *a*, *a*, is shogged laterally or sideways, and the weft (which has been previously placed in the notch at the end of the weft-carrier *a*,) is by that means carried or passed through the shed, and is received on the points of the vertical pins *g*, *g*, *g*, which are fixed to the moveable bar C, and are raised up (by the means hereafter described), in order to receive the weft. When the weft has been placed over the points of the

pins *g*, *g*, the sliding-bar A, with its carriers *a*, *a*, is moved back again, leaving the weft in the shed to be beaten up by the batten; the shed is then changed, and the weft-carriers *b*, *b*, of the other sliding-bar B, carry over their shoot, which is received on to the points of the pins *g*, *g*, on the opposite side of the piece, and the weft is again beaten up. These alternate operations of the weft-carriers *a*, and *b*, are continued until the piece of fabric is completed. The bar C, which carries the upright pins *g*, *g*, *g*, is moved up and down, in order to receive the weft-threads on the points of the pins, every time that either of the weft-carriers moves across, and the pins are kept steady by the brass sockets or guides *i*, *i*, *i*, on the fixed bar D. When the threads are received on their respective points, the carriers return, but the pins remain stationary in their elevated position until the weft is beaten up by the batten, when the bar C, descends and releases the threads from the points of the pins. The bar C, is actuated by cams, mounted on a shaft below, which act against the lower ends of the rods *h*, *h*; these cams are driven by suitable gearing, not shewn in the drawing, but which is connected with the main or driving-shaft in any convenient manner, according to circumstances and the arrangement of the other parts of the loom. The carrier-bars A, and B, are also actuated by cams, in a similar manner to the bars A, and B, of figs. 1, and 2; but as, in the present instance, the two bars A, and B, are not required to act simultaneously, as in the first described plan, but alternately, of course two separate cams or excentrics, actuated by a proper arrangement of gearing in connection with the driving-shaft, must be employed to produce the motion required. As, however, the varied construction and arrangement of ribbon looms involve a different arrangement of mechanism to suit the particular circumstances of every case, and the description of fabric to be produced, it is considered useless to enter into minute details of the parts required for giving the necessary movements to the thread-carriers, &c., as any intelligent mechanic will be able to adapt the improvements to any description of loom for which they may be required, or to which they may be applicable.

Figs. 7, 8, 9, and 10, represent another mode of passing the weft-threads through the shed, by means of what is denominated revolving carriers, whereby a great economy of space is obtained; that is to say, a much greater number of pieces can be woven in a loom of this description than in ordinary looms. By this peculiar arrangement and construction of parts, the patentee states, that he is enabled to weave pieces of ribbons so close together as only to leave from an inch to an inch and a half, or sometimes less space, between the selvages; whereas, hitherto it has always been absolutely necessary to leave sufficient space between the pieces to receive the shuttles or weft-carriers after they have laid in the weft, and which will require from four to six or eight inches, according to the width of the fabric. Fig. 7, represents a plan view of the loom; fig. 8, is a sectional representation of a portion of the novel parts, drawn upon an enlarged scale, and shewing the form and means of working the revolving weft-carriers and points; fig. 9, is an elevation of the same, also upon an enlarged scale, looking from the batten towards the weft-carriers; and fig. 10, is a plan view, shewing the position of the weft-carriers in relation to the warp when in a quiescent state. In this arrangement, instead of placing the weft-carriers at right angles with the warp, as in the plan shewn at fig. 6, they are mounted in guides or brasses *i*, *i*, affixed to the breast-beam or bar *j*, *j*, and are placed lengthwise or parallel to the side of the warp. The form or construction of the revolving weft-carriers will be best seen and understood by reference to the detached view, fig. 8. The weft-carriers A, and E, are made of bent wire, and are, as before stated, mounted in the upright guides *i*, *i*, of the bar *j*, *j*. The upper end of the weft-carriers is furnished with an eye-hole or notch, to receive the weft-thread, and the lower end is bent back, and is inserted into a notch in, or jointed to, the sliding-bars B, and C; which bars are alternately moved sideways, or backwards and forwards, by means of cams or excentrics, which act against levers, connected with one end of the sliding-bars B, and C, and are actuated by gearing, connected with the main or driving-shaft, in a similar manner to that already described in

reference to the foregoing figures. D, and F, are upright pins, affixed to the bar G, and are worked up and down to receive the weft-thread as it is carried over, in precisely the same manner as those shewn at D, in fig. 6. The weft-threads are wound upon bobbins, and placed behind the harness at the back part of the loom, as shewn at fig. 7, where two bobbins are represented as belonging to each piece of ribbon, in order that selvages may be made at both edges. The shed having been formed in the ordinary manner, and the weft-threads placed in the eyes of the revolving carriers, the action of the several parts will be as follows:—The sliding-bar B, will, by means of its cam below, be moved sideways, and by acting upon the horizontal tail of the weft-carrier A, the upper horizontal arm of the said carrier will be moved round into the position shewn by dots in fig. 10, and at E, in the plan view, fig. 7. When the thread has been carried through the shed to the opposite side of the piece, by the horizontal arm of the weft-carrier, as above stated, the point-bar G, is raised, and one of the points is made to receive the thread from the weft-carrier, which then returns to its original position, leaving a double thread of weft in the shed; the weft is then beaten up by the batten, and, after the shed is changed, the other weft-carrier E, is caused to move across in its turn, in precisely the same manner, by the sliding-bar C, moving laterally in the opposite direction, through the action of its cam or excentric; the point-bar G, again rises, and one of the points F, receives the thread from the carrier E, which then returns to its original position, leaving the double thread of weft in the shed. By thus causing the weft-carriers to act alternately, and the point-bar G, to rise every time the weft is thrown across from either side, a selvage is produced at both edges of the ribbon, and the operations of the loom are continued in the same manner until the whole piece is completed. Fig. 11, represents the cam-wheel which actuates the sliding-bars B, and C; this wheel must be made to revolve once for every two beats up of the batten. The excentric groove, which works the sliding-bar B, is placed on one side of the wheel, and the other excentric groove, which works the other bar C, is on the opposite side, as shewn by dots in the figure.

Fig. 12, represents an end elevation of another mode of carrying the weft across by means of revolving carriers. This plan is a modification of that just described; but in this instance the points D, and F, and the bar G, are dispensed with; and in place of carrying the weft-thread across alternately to the points D, and F, on which it remains while the operation of beating up takes place, the carriers themselves are furnished with points, and are made to fetch the thread across.

The weft-carriers are worked by means of the sliding-bars B, and C, in precisely the same manner as in the plans above described; but instead of the upper horizontal arm of the carriers being made rigid, as in the former instances, it is made of steel, so as to give it some degree of elasticity; and in place of making an eye-hole or notch at the extremity of the carrier, it is furnished with a short upright pin or point, as shewn in the figure. The weft is wound upon bobbins mounted in a frame behind the harness, as in the former instance; and as the sliding-bar B, is moved laterally by means of its cam and lever, the carrier is turned round in its guides, and the horizontal spring-arm, with its point, is carried through the shed to the opposite side, where it receives the weft thread over the point, and, as it returns to its original position, it carries the weft with it, leaving a double thread in the shed, as in the former instance.

When the weft has been laid in the shed, it must be released from the point at the end of the weft-carrier, just before the batten beats up. This is effected by means of the rods or pushers *k*, *k*, which are mounted in or affixed to the vibrating-bar L, immediately above the horizontal arms of the revolving weft-carriers. The bar L, is connected to one end of the vibrating lever I, I, which carries at its opposite end a counter-balance weight J. A rod K, is connected at its upper end to the vibrating lever I, I, and at its lower end to a cam or excentric on the main driving-shaft, in such a manner, that as the batten advances to beat up the weft, the rod K, will pull down the vibrating levers I, I, and through the medium of the rods or pushers *k*, *k*, depress the horizontal arms of the weft-carriers, so that the weft will be released from the points and left free to be beaten up close by the batten; and when

the rods *k, k*, have performed their work of releasing the weft, they are brought back into their original position by the counterbalance weight J. By this means ribbons with a beautiful pearl edging will be produced; but if plain edges are required, a suitable apparatus must be adapted to the loom, for the purpose of pulling up or tightening the loose weft, which is left to form pearl edgings. This is effected in the following manner:—All the weft threads from the bobbins are passed through nippers or tweezers, as at E, fig. 12, and also through a single leisch, as at H; and when the batten has beaten up the weft, the nippers or tweezers E, are closed, by pulling down the cord *g*, and are made to nip and hold the weft firmly; while the leisch H, is forcibly drawn down by the cord G, a sufficient distance, as shewn by dots, in order to pull the weft tight and leave a plain selvage to the ribbon. The nippers E, and leisch H, are worked by two heart-wheels or cams, mounted on the driving-shaft, or any other shaft that may be more convenient, taking care, however, that the nippers E, are closed, and hold the thread firmly, before the leisch begins to draw down. It may be as well to observe, that the cam or heart-wheel which draws down the leisch, should be sharper pointed than the cam which closes the nippers; but the length of its long radius must altogether depend upon the tension required for the weft thread: its form will therefore vary according to circumstances. M, is a small counterbalance weight, attached to the end of a cord, which passes from the leisch H, over a pulley above, and serves to bring back the leisch, with the weft thread, into its original position, when the object of its operation is effected.

In conclusion, the patentee remarks, that he is aware of shuttles having been carried through the open sheds of narrow fabrics by means of upright pins or studs, fixed on a sliding-bar or bars, and which studs are made to take into holes, forced near the ends of the shuttle; he does not, therefore, wish to claim any such arrangement, as constituting any part of the present improvements. He claims, Firstly,—carrying shuttles or weft-carriers into and out of a shed by means of horizontal arms, connected to a sliding-bar or bars; whereby a greater number of widths of fabric may be woven, in a given

space, than in looms of the ordinary description. Secondly,—carrying the weft into or through the shed by means of horizontal arms or weft-carriers, attached to a sliding-bar or bars, as shewn in fig. 6. Thirdly,—carrying the weft through the shed by means of "revolving carriers," which turn horizontally on their centres, and are actuated by sliding-bars, and either carry the weft in or fetch it across the shed, as shewn and described. The employment of such revolving-carriers is claimed, in whatever way they may be actuated; the object being to supersede the use of shuttles, and thus greatly reduce the space between the pieces, and thereby weave a greater number of pieces within a given width.—[*Inrolled in the Petty Bag Office, September*, 1846.]

Specification drawn by Messrs. Newton and Son.

To HENRY SEYMOUR WESTMACOTT, *of No. 28, John-street, Bedford-row, in the county of Middlesex, Gent., for an improvement in the construction of rotatory steam-engines,—being a communication.*—[Sealed 30th May, 1846.]

THIS invention consists in a peculiar construction of rotatory-engine, to be worked by steam; which engine is exhibited in transverse section at fig. 1, in Plate X. *a*, is a stationary cylinder, containing the moveable wheel *b*, fixed on the axis *c*. The wheel *b*, is provided with four sliding plates or pistons *d*, *d*, which work in suitable recesses *e*, *e*, in the arms of the wheel, and are kept in contact with the interior of the cylinder *a*, by means of springs, contained in the recesses *e*, *e*. The side plates of the wheel *b*, project beyond its periphery, and work in contact with the interior of the cylinder *a*; thus forming an annular space or channel, in which the steam acts upon the pistons or sliding-plates *d*, *d*. *f*, *f*, are the steam pipes or induction passages for the steam; and *g*, *g*, are the eduction passages, either connected with the condenser or open to the atmosphere. *h*, *h*, are steam stops, fixed to the interior of the cylinder *a*, and suitably formed for closing the steam-channel. The steam entering the cylinder *a*, at the induction passages *f*, *f*, acts on the pistons or plates *d*, *d*,

immediately before those passages, and, forcing them forward, causes the wheel *b*, and consequently its axis *c*, to revolve; directly the pistons have passed the eduction passages, the steam escapes from behind them through the latter, and as the rotation of the wheel continues, the pistons are gradually forced back toward the centre of the wheel by the inclined surface of the steam-stops; but when they have passed the steam-stops, the pistons are pressed outward by the springs before mentioned, and are again acted on by the steam.

The engine above described can revolve in one direction only, but fig. 2, represents a transverse section of a modification thereof, which can rotate in either direction. In this arrangement the steam-stops *h*, *h*, are shaped differently, and the steam can be admitted either through the pipes *f*, *f*, or *g*, *g*; these pipes are connected with the steam-chest *i*, which contains a slide-valve *j*, and is supplied with steam by the pipe *k*; the eduction steam being discharged by the pipe *l*, either into the condenser or into the atmosphere. When the slide-valve is in the position shewn at fig. 2, the steam enters the annular space or channel through the pipes *f*, *f*, and the eduction steam is discharged through the pipes *g*, *g*,—the engine moving in the direction of the arrow; but if the slide-valve be moved to the opposite end of the steam-chest, the steam will enter through the pipes *g*, *g*, and pass off through the pipes *f*, *f*, and the wheel will thereby be caused to rotate in the opposite direction.

The patentee claims, as his invention, the improved rotatory steam-engine, constructed and arranged as above described.—[*Inrolled in the Inrolment Office, November*, 1846.]

To ARTHUR HOWE HOLDSWORTH, *of Brookhill, Dartmouth, in the county of Devon, Esq., for improvements in buoys, and in giving buoyancy to boats.*—[Sealed 29th August, 1846.]

THIS invention consists in the employment of tubes, vessels, or apparatus made of India-rubber, prepared as described in the specifications of patents granted to C. Hancock and

A. Parkes, for forming buoys, and imparting additional buoyancy to boats.

The life-buoys made by the patentee, are tubular vessels of prepared India-rubber, filled with air, exactly like those hereafter described for boats; in fact, each air vessel, when thrown from the boat into the water, will constitute a life-buoy; and cords may be attached to these tubular vessels, to admit of a person securing himself thereto. "Watching buoys" may be made of any desired form, but the patentee prefers a globular shape, or a cylinder with hemispherical ends; they are enclosed in a net made of strong cord, and the mouth of the net is secured to a ring, to which the mooring chain is to be fastened.

In order to impart additional buoyancy to boats, the patentee employs tubular vessels of prepared India-rubber, filled with air; these may be attached by cords to the raisings under the thwarts, extending from the head to the stern, or they may be placed across the boat, beneath the thwarts, and secured thereto by cords. Apertures five inches long and three inches wide, are made in the sides of the boat (the bottom of such apertures being level with the thwarts), and each aperture is furnished with a door or valve, opening outwards, so that water may be discharged but cannot enter through them. When applying this invention to the quarter boat of a large ship, the patentee makes four apertures in the sides and applies valves thereto; to each side of the boat he attaches six tubes, six feet long and six inches in diameter, four being secured to the raisings below the thwarts and two to the raisings above the thwarts: each tube is capable of supporting from seventy-four to eighty pounds when immersed in the water. The reason for placing the tubes at the side, rather than across the boat is, that she may be more readily restored to an even keel, if, in being lowered from the ship, or from any other cause, she should be thrown on her side and suddenly filled with water; when this happens, the buoyancy of the tubes causes the boat to rise and the water to flow from it through the apertures, until the gunwale becomes elevated to a height above the surface of the sea, corresponding to the difference in height between the aper-

tures and the gunwale—the crew can then easily throw out the remainder of the water. Boats intended to be used solely as life-boats, have six or eight apertures in their sides, and in addition to the ordinary raisings under the thwarts, one or two more are fixed below them, and to these additional tubes are secured.

In Plate X., a transverse section of a boat, constructed according to this invention, is exhibited. *a, a,* are the side and bottom planks; *b, b,* the ribs; *c, c,* the thwarts; *d, d,* the internal bottom boards; *e, e,* the raisings or rails under the thwarts; *f,* one of the tubular vessels attached thereto; *g, g,* the additional rails; and *h, h,* the corresponding tubular vessels. *i,* is a tube connected to the under side of the thwart by cords, for which purpose the rails *j,* are applied; *k, k,* are the valves or doors for closing the apertures in the sides of the boat; they turn on a hinge at the upper part, are furnished with weights to cause them to close readily, and can be kept closed, when required, by means of the cords shewn in the drawing. —[*Inrolled in the Inrolment Office, February,* 1847.]

To Frederick Ransome, *of Ipswich, in the county of Suffolk, engineer, and* John Crabb Blair Warren, *of Little Horksley, in the county of Essex, clerk, for certain improvements in the manufacture of bricks, tiles, pipes, and other articles composed of plastic materials, and in the preparation of plastic materials to be used for such purposes.*—[Sealed 6th July, 1846.]

This invention of improvements in the manufacture of bricks, tiles, pipes, and other articles, composed of plastic materials, and in the preparation of plastic materials to be used for such purposes, consists, firstly, in incorporating certain ingredients with the clay or other plastic material, before the clay is formed into the required articles, whereby the plastic materials, so prepared, are rendered more applicable to the manufacture of tiles, pipes, or bricks, for draining land and other similar purposes; and secondly, in a certain novel or improved arrangement of machinery or apparatus for forming

bricks, tiles, and other articles of clay or plastic materials, either prepared in the manner hereafter described, or in the state in which they are usually employed for these purposes.

The first part of the invention consists in incorporating and intimately mixing with the clay or plastic materials, of which bricks, tiles, or other similar articles are usually composed, any description of vegetable, bituminous, or other substances that are susceptible of being destroyed by fire, or burnt out of the bricks, tiles, pipes, or other articles, when the said articles are submitted to the ordinary process of burning. The vegetable, bituminous, or other materials employed for this purpose are saw-dust, spent tanners' bark, shavings, wood chips, charcoal, sticks or refuse wood (broken or cut up into very small pieces), chopped straw, chaff, or other vegetable substances, small coal, asphalte, pitch, or other suitable bituminous or mineral substance, that may be burnt out by fire or decomposed.

The proportions in which these matters should be mixed with the clay or plastic material will depend upon the nature of the material to be added; care being taken that the destructible matters do not bear so great a proportion as to destroy the tenacity of the clay, or plastic material, or indestructible substance of which the body of the brick, tile, or pipe, is composed, when the brick, pipe, or tile, has been properly burned, and the destructible substances thereby removed or decomposed, as that would impair the strength of the article and render it useless for the purpose to which it is intended to be applied. As the sole object of adding these destructible ingredients is to render the article porous, the addition of one-tenth part by weight, more or less, of the destructible to the indestructible or plastic ingredients, will be found to effect this object.

These materials, in the above or any other suitable proportions, according to the nature of the ingredients employed, should then be intimately mixed together in a pug-mill, or other suitable apparatus, or, if thought desirable, they may be ground in a mill, to ensure their thorough admixture or incorporation; after which the plastic compound may be formed, either by hand, in the ordinary manner, or by the assistance

of any suitable machinery, such as that hereinafter described, or any other, into the articles that may be required; and, when sufficiently dry, the articles so made must be well-burnt, by exposure to an active fire, so as to effectually burn away all or the greater part of the destructible vegetable or bituminous or other matters; leaving the brick, tile, or pipe, in its original shape or form, and sufficiently strong for the purpose to which it is intended to be applied. Tiles, bricks, and pipes made in this manner will be found to be exceedingly porous, and, when employed for draining, will allow the water from the adjacent earth to percolate or filter freely through them into the hollow space within, but at the same time effectually prevent any sand or extraneous matters from entering the drain. Tiles, bricks, or pipes of the ordinary description employed for subsoil draining are so slightly porous that, in order to render them effective in draining the land it has generally been found necessary to make a bad joint, or leave the joints a little apart, so as to allow the water to enter the pipe, which it could not otherwise do very readily. The consequence is, that in some soils the passages very soon get choked up by an accumulation of mud or sand, which is carried into the pipe by the water through the openings of the joints, and the drainage is completely stopped; or if the joints are too close, so as not to admit the water very readily, it will not get into the pipes at all, but will accumulate around them, and can only be removed by natural drainage or evaporation. When employing the improved draining tiles, pipes, or bricks, the joints are made as accurate as possible, and the water percolating freely through the body of the pipe, tile, or brick, will be prevented from carrying with it any earthy matters, which would form a deposit. By this simple means it will be seen that a subsoil drain may be formed, which will last without attention or repair for many years.

The second part of the invention consisting, as before stated, in a novel or improved arrangement of machinery or apparatus for forming bricks, tiles, pipes, and other articles, of clay or plastic material, is shewn in Plate VIII.

Fig. 1, is a side elevation of the machine, partly in section, to shew the interior construction; and fig. 2, is a plan or

bird's-eye view of the same, also partly in section. In this arrangement of brick and tile machine, two horizontal fixed cylinders are employed, furnished with dies at their outer ends, and doors at their upper part for the admission of clay, which is forced out through the dies by the action of pistons working within the cylinders, in the manner commonly practised. The peculiarity of this part of the invention consists in the mode of actuating the pistons, which press the clay or other plastic material through the dies, to form the kind of tiles or bricks required. *a, a,* are the horizontal cylinders, firmly secured to a bed-plate by bolts or otherwise; *b, b,* are suitably-formed dies, bolted respectively to the outer ends of the cylinders *a, a*; *c, c,* are doors hinged to the cylinders *a,* and provided with a bolt *d,* for securing them at certain parts of the operation of the machine; *e, e,* are the pistons, attached together by a plate *f, f,* and, when actuated, moving simultaneously. Upon one face of this plate is a series of pins *g, g,* into which a pinion *h,* takes alternately on the upper and under side thereof. *i, i,* are semi-circular guides attached to the plate *f, f,* and intended to keep the pinion, when it has arrived at either end of the series of pins, still in gear therewith, in order that the traverse of the pistons may be continuous. The pinion *h,* is mounted in a slotted bearing *k,* and its axle may be provided with a winch-handle, for communicating a rotating motion to the pinion. The cylinders *a,* are filled alternately with clay or other plastic material by withdrawing the bolt *d,* and opening the door *c.* When the cylinder is filled, the door is closed and fastened, and the rotation of the pinion *h,* will then bring forward the piston, and cause the clay just filled in to find an exit through the die *b.* While this is being effected, the other cylinder is ready to be charged with clay, which in its turn will be forced out by the return motion of the pistons. It will now be understood that the continuous rotation of the pinion *h,* in one and the same direction, will force the pistons alternately forward in their respective cylinders, and cause them to press the clay contained therein through the dies attached to the ends of the cylinders. In some cases, instead of filling the cylinders by hand, as is the plan generally adopted, the patentees propose

to attach a hopper to each cylinder, whereby the clay may be fed in by the rotation of "sweepers" or arms, set radially from the central shaft, and at an inclination from the perpendicular. When these hoppers are used, it will be necessary to stop the supply of clay as the pistons advance to press it through the dies: this may be done by a sliding-plate, or a valve, opening inwards, being made to close the bottom of the hopper; or the pistons may be provided with a shield to shut out the further supply of clay as they advance. In either case it will be requisite to stop the rotation of the sweepers or arms of the pug-mill. It is obvious that any form of die may be used, as required, and the machine may be driven by manual or other power.

The patentees state that they are aware of ashes or cinders having been mixed with the plastic materials of which bricks, tiles, pipes, or other similar articles have been made, but for a very different purpose, and with a different effect to that which is contemplated by the present invention; they do not therefore wish to claim the use of such ingredients as constituting any part of the invention. They claim, First,—preparing clay or plastic materials for forming bricks, tiles, pipes, and other similar articles, by the admixture or incorporation with the other ingredients of which such articles are usually composed, of vegetable, mineral, or bituminous substances, which, being destructible or partially destructible by fire, may, when mixed with other ingredients, and acted upon by fire or other destroying agents, be consumed, burnt away, or decomposed from the clay or indestructible plastic materials; leaving the latter exceedingly porous, and particularly applicable to subsoil draining and all purposes where filtration and porosity are required. With respect to the second part of the invention, the patentees state, that several modifications might be devised for effecting their contemplated improvements, viz., giving a forward motion to two pistons alternately by a continuous rotary motion; for instance, the pinion *h*, might be made to work in a hollow rack, and take alternately into an upper and under set of teeth; they therefore do not confine themselves exclusively to the arrangements above shewn, but claim the application to brick and tile machines

(of the above described construction) of such gearing as will, by the continuous rotation of a pinion in one direction, cause the pistons or plungers to move alternately in opposite directions.—[*Inrolled in the Petty Bag Office, January,* 1847.]

Specification drawn by Messrs. Newton and Son.

To James Warren, *of Montague-terrace, Mile-End-road, in the county of Middlesex, gent., for improvements in the manufacture of cast screws.*—[Sealed 31st August, 1846.]

This invention consists in certain improvements upon the apparatus for making cast screws, forming the subject of a patent granted to the present patentee, August 4th, 1841.

In making moulds for casting screws by the machine described in his former specification, a series of pattern-screws were screwed into the sand or other material, and then unscrewed, so as to leave the required impressions in the sand; on the upper part of the stems of the pattern-screws guide-screws were formed, which, by working in female screws formed in a fixed plate, regulated the descent and ascent of the pattern-screws: the tops of the stems were formed into cranks, the ends of which entered into openings in a revolving plate, and by this means rotary motion was imparted to the pattern-screws. The frame containing the screws was raised and lowered by means of a lever. A moulding-plate was used for producing the impressions of the heads and the "gets and sprays." This brief description is given in order that the nature of the present improvements may be readily understood.

In Plate X., fig. 1, is an elevation of the improved machine for cutting the screw-threads in the sand mould, which is very similar to that described in the former specification; but instead of a guide-screw and a pattern-screw being formed on the same stem, the guide-screws and pattern-screws are made separate, so that not only can the pattern-screws be easily replaced when worn or damaged, but several different pattern-screws may be used at different times with the same guide-screws; and in place of the apparatus for pressing being such

as before described, a screw and a ball-and-socket joint is used, so that the pressing apparatus may adjust itself to the surface of the moulding-box. In making the sand moulds, instead of causing the pattern-screws to be driven into solidly rammed sand in which an impression of the heads has been made, the moulds are to be so formed, that not only will there be impressions of the heads in the moulds, but also the impressions for a considerable part of the stems will be produced in the moulds before applying the screwing apparatus, and therefore less power will be required for working the screwing apparatus. The moulds are also so made, that each screw will be cast with a nick in its head; and the gets and sprays or channels for the metal to run in are so formed, that there will be a channel between every two rows of screws, to allow of the screws being joined with a spray of metal at the top of their heads. By this means, the under parts or cones of the heads are cast perfect, and the spray being broken off, the heads of the screws may be perfected by bringing them into contact with a grindstone or "bob."

Three modes of carrying out the first improvement, viz., making the pattern-screws separate from the guide-screws, are shewn at figs. 2, 3, and 4, but the patentee does not confine himself thereto. At fig. 5, is shewn a cranked socket, by the use of which many of the guide-screws may be dispensed with; from six to twelve being sufficient to regulate the insertion or withdrawal of all the pattern-screws; but the patentee prefers to use a guide-screw to each pattern-screw.

The second improvement is shewn at fig. 1. *a*, is a screw-shaft, carrying a wheel *b*, by which it is turned; the lower end of the screw-shaft, which is spherical, works in a hemispherical bearing on the cross-head *c*, and is retained therein by brasses *d*, *d*, keyed as shewn. The cross-head is connected with the apparatus that carries the pattern-screws by connecting rods or links *e*, *e*, by which arrangement the apparatus for forming the screw-threads in the moulds will be readily pressed down and raised up; and in order to ensure the correct position of the moulding-box beneath the screwing apparatus, guide-pins *f*, *f*, are provided, which enter into holes in the projections *g*, *g*, on the moulding-box.

The operation of making the moulds embraces the remainder of the improvements, and is as follows:—Figs. 6, exhibit a plan and edge view of the "heading-plate," on to which a moulding-box or flask is to be placed, and on sand being rammed therein, the mould will be produced, with impressions of the heads of the screws, and also with conical impressions for forming the stems of the screws; in place of the screwing apparatus making both the impressions of the stems and the threads, as described in the former specification. Sometimes, instead of the pins or studs for forming the impressions of the stems being fixed to the heading-plate, as shewn at figs. 6, the pins are fixed on a separate plate, and caused to pass through holes in the screw-heads on the heading-plate; by which means, the same heading-plate can be used with different pins for making screws of various lengths. In forming the mould, the ridge *h*, on the heading-plate produces the main channel for the metal to run in; and then a plate, called the spray-plate (represented at figs. 7, and 8; fig. 7, being a plan view, and fig. 8, a section on the line A, B, of fig. 7,) having projections *i*, *i*, upon it, is used to make the top part of the mould with the channels, for the passage of the metal laterally between every two rows of screws across the mould, so that the heads of every two screws will be connected by a get of metal, as shewn on an enlarged scale at fig. 9. In order that the nicks may be cast in the heads of the screws, the patentee also employs the moulding-box or flask (shewn in plan view and section at figs. 10), for making the top part of the mould; in this box are fixed several metal blades *j*, *j*, extending from side to side, and corresponding with the rows of screws (being covered with blacking, to prevent the hot metal from adhering); and the moulding-box or flask being placed on the spray-plate, the edges of the nicking-blades *j*, *j*, enter into the grooves *k*, *k*, formed across the spray-plate, and then the sand is rammed in. It will therefore be seen that one half of the mould is formed by ramming the sand into a suitable moulding-box or flask on the heading plate, and then submitting it to the action of the machine, fig. 1; and the other half of the mould is made by using the spray-plate and moulding-box or flask (figs. 10,) with the

nicking-blades;—the complete mould, ready for receiving the metal, is shewn in section at fig. 11.

The patentee claims, Firstly,—making the guide-screws and pattern-screws separate, as above described; and the cranked socket, fig. 5. Secondly,—applying the spherical joint and apparatus combined therewith, for lowering and raising the screw apparatus. Thirdly,—making the holes for the stems of screws in the mould, before subjecting the mould to the operation of the pattern-screws. Fourthly,—making the sprays at the top of the heads of the screws, as described. And, Fifthly,—the mode of making nicks to the several screws cast at one time, by nicking-blades contained in the mould.—[*Inrolled in the Rolls Chapel Office, February*, 1847.]

To James Coles, *of Harley-street, Cavendish-square, in the county of Middlesex, surgeon, for improvements in apparatus for the prevention and treatment of distortions of the spine and chest, and also for the treatment of diseases of the spine and other disorders where a recumbent position of the patient is required.*—[Sealed 3rd September, 1846.]

This invention relates, firstly, to a new method of constructing the "prone-couch," which is employed for keeping the patient in a recumbent position on the stomach and chest, either by day or by night; and consists, secondly, in the combination therewith of various arrangements of apparatus to be used in the performance of certain exercises for strengthening and otherwise benefitting the muscles of the back, chest, and extremities of the human body.

In Plate IX., fig. 1., is a diagram, designed to illustrate the construction of the prone-couch; it consists of a horizontal frame *a*, supporting a flap *b*, to which a sloping-board *c*, with a moveable foot-board *f*, is hinged at *; and it is supported by the end of the sloping-board and two legs *d*, *d*, connected together by the bar *e*. In reclining upon the couch, the body of the patient rests on the horizontal flap, from the point of the shoulder as far as the bend of the hip, from whence the lower extremities hang downwards upon the

sloping-board towards the foot-board. It is important that the horizontal flap should be of a length corresponding to the distance between the bend of the hip and the point of the shoulder of the patient; the patentee therefore proposes to substitute a sliding framework in place of the board forming the old flap, by which means he is enabled to adjust the length of that part of the prone-couch to the size of the patient. The sliding framework (shewn at figs. 2, and 3,) is constructed in two parts, as follows:—Upon two pieces of half-inch board *g*, and *h*, of the same width as the sloping-board of the prone-couch, and seven inches long, are screwed or glued lengthways a number of rails *i*, *i*, of equal thickness, and fourteen inches long; their width being proportioned to the number employed, so that the projecting ends of the rails on one board will slide into the spaces between the rails of the other, when the two parts are put together, as in fig. 3. Two similar pieces of half-inch board are then fixed on the top of the rails, and the two parts of the frame, thus constructed, are put together, by inserting the ends of the rails of one part, into the spaces between the rails of the other; and the two parts being closed, the rails are entirely concealed, and a level surface presented, as shewn at *b*, in fig. 6. The frame is adjusted by means of a screw; or the two parts may be moved to and from each other by hand. When the frame is extended, its upper surface presents a depression, half an inch deep, and of a width dependent upon the distance to which the parts are separated; and this would permit the mattress that lies upon the couch to sink, and thereby destroy the equality of the surface; to remedy which, a thin brass plate, of the same width as the frame, and of a sufficient length, is screwed upon one division of the frame, and covers the depression when the frame is drawn out. In order that the foot-board may be fixed at any height on the sloping portion of the couch, and in such a manner that the mattress may lie under it, the patentee constructs it in the manner shewn at fig. 5. *j*, *j*, are two brass or iron brackets, attached to the foot-board, and projecting below it to an extent corresponding with the thickness of the mattress (generally about two inches); the lower end of each bracket expands and

forms a foot, at the same time turning inwards beneath the mattress; and from the under surface of this part of the foot, two button-headed pins project downwards; these pins are introduced into key-holes in two brass or iron plates on the sloping-board of the couch, and by them the foot-board is retained at the desired height.

The parts which the patentee claims as new in the prone-couch, constructed as above described, are the expanding frame and the foot-board.

Fig. 7, exhibits what is termed the orthopœdic sofa, which is a combination of the prone-couch with apparatus for performing various exercises in one machine, and when not employed as a remedial agent, may be used as a common sofa. The mode of constructing the sofa is as follows:—A strong horizontal frame of wood *k*, fig. 4, is made similar to an ordinary sofa frame; it is about seven feet long by twenty-two inches wide, and the pieces of wood forming the frame are three inches deep by two inches wide; the upper surface of each side piece is grooved on the inner side, to the extent of half an inch in depth and an inch in width, as shewn at *l*, and the frame rests on four legs. Within the frame, and forming its bed, lie those parts of the prone-couch which compose the horizontal expanding flap and sloping-board (see fig. 6,); the latter is divided into two parts, and the three pieces or flaps are hinged together; they are not attached to the sofa-frame, but the middle flap is hinged to a square wooden frame *m*, which slides in grooves made in the sofa-frame at *n*;—*o*, is an iron cross-stay for strengthening the sofa-frame. These flaps, when lying horizontally within the sofa-frame, are supported in the middle by the sliding-frame, and in front by brackets, hereafter described; and the bottom flap being hinged to the middle portion is retained in its place at the other extremity by two bolts, which enter the grooves *u*, in the sofa-frame, and traverse therein when the sliding-frame is moved backwards and forwards: this movement is effected by means of a screw, attached to the under surface of the sliding-frame, and working in a nut fixed to the cross-stay *o*.

Fig. 6, shews the couch and its sliding-frame removed from the sofa, and elevated upon its brackets for use. This is done

by drawing the bolts in the bottom flap, and allowing it to drop to the floor; the middle flap is then raised, to complete the slope; and this flap and the horizontal flap are supported in their places by the brackets. The brackets are shewn at *p*, *p*, in figs. 4, and 6, and on an enlarged scale at figs. 8; being represented in the position they would assume when packed away under the expanding flaps of the couch, which they then support as part of the sofa-bed, and also in the position they would assume when supporting the flaps in forming the prone-couch. The standard A, (fig. 8,) must be of a length proportioned to the height to which the horizontal portion of the prone-couch is to be raised; it is jointed to a flat foot B, which is bolted to the under surface of the front cross-bar of the sliding-frame; the head C, of the standard is formed with a deep groove D, in its upper surface, to the posterior extremity of which is hinged a tongue E, of a length proportioned to that of the horizontal flap of the prone-couch; and this tongue, when the bracket is not in use, lies in a straight line with the standard on the inside of the sofa-frame, where it is supported by a pin *q*. When the standard is raised perpendicularly, the tongue drops into the groove in its head, and forms a horizontal rest for the horizontal flap of the prone-couch; and a loop F, jointed to the tongue, passes over the head of a thumb-screw attached to the sloping-board, and is secured thereto by a turn of the screw, which fixes the couch and bracket in their places. A strong screw G, passes upwards through the head of the standard into the groove beneath the tongue, so that by turning it the tongue will be raised, and the horizontal flap caused to assume a more or less sloping position.

To the cross-rail at the foot of the sofa, a hollow cushion or foot-scroll *r*, fig. 7, is hinged, so as to turn back level with the sofa-frame; it contains the apparatus represented in fig. 10, which is exposed to view when the scroll is turned back, as in fig. 11. The apparatus consists of a strong spiral spring, coiled round a spindle, and enclosed in a cylinder *s*, of brass, tin, or other material; the spindle *t*, revolves when required, and is fixed at other times by a ratchet-wheel and click *u*. Upon the spindle, at each extremity of the cylinder, is fixed

a sheave or pulley *v*, on which is wound a strap, about five feet long, with a spring loop at the end. Upon the outside of the left-hand sheave is fixed a ratchet-wheel, working in a box *w*, to which a lever or click *x*, is attached; the pointed end of the latter taking into the ratchet-wheel, and the other end projecting out of the box. The right-hand end of the spindle is squared to receive a handle *y*. Round the middle of the cylinder is coiled a strap, about six feet long, and furnished with a wooden handle *z*; this handle, when not in use, is supported on two hooks, fixed on the inner side of the cross-bar of the scroll, and when in this position it prevents the cylinder from moving, whilst the spindle is in action in the "stretching exercise," as the ratchet-wheel and click secure the spindle when the cylinder is to be used in the "sawing exercise." In performing this exercise, the patient grasps the handle *z*, with both hands, and alternately raises it above her head, and depresses it; the action being similar to that of sawing timber by a two-handled saw.

At the head of the sofa is a scroll, surmounting a square box a^1, to which it is hinged, and serves as a pillow for the patient whilst reclining on the couch. When turned back, the scroll forms a table, at a convenient height, in front of the couch; and it is for the purpose of altering the distance between this table or the pillow and the couch that the frame upon which the latter rests is made to slide. An iron spindle passes through the scroll, and its ends are squared to receive handles, by means of which the "grinding exercise" can be performed, with one or both hands, by the patient whilst reclining on the couch. The square box a^1, is hinged to the cross-rail of the sofa-frame, like the foot-scroll; and the box and scroll can be turned back, when required, to form a level surface with the sofa-frame, as at fig. 11. When the box is turned back, a hand-rail b^1, is exposed to view, which is grasped by the patient whilst stretching; and during this process the box is fixed in its open position by means of a brass loop, attached to the box; and passed under the cross-rail of the sofa-frame, and there fixed by means of a thumb-screw,—a similar loop is attached to the foot-scroll for the same purpose.

On each side of the sofa-frame, near the head, there is a fixed spindle c^1, passing through the side of the sofa, and rivetted into an iron plate d^1: these spindles are for the purpose of receiving handles, to be used in the "swimming exercise." To perform the swimming exercise, a traversing cushion is required, which is constructed upon a frame of wood, of the same width as the sofa (see fig. 9, which is a plan view of the under side of the cushion); it rests upon two longitudinal bars, attached to the under surface of its frame, in such a manner as to fit into the grooves on the upper surface of the side-rails of the sofa-frame; and in these bars are inserted four friction-rollers e^1, which admit of the cushion traversing easily the whole length of the sofa-frame, backwards and forwards. In performing the swimming exercise, the patient lies upon the traversing cushion, and, grasping the handles upon the fixed spindles, draws herself backwards and forwards to the extent of her arms, by turning the handles. Two cushions, similarly constructed to the traversing cushion, but without rollers, are employed to fill the remaining space between the head and foot-scrolls, and cover the apparatus beneath, when the sofa is to be used as an article of furniture.

Fig. 12, represents the apparatus by which the "rowing exercise" is performed; it consists of a strong steel plate f^1, wound as a spring round an iron spindle g^1, to which it is rivetted; the outer extremity of the spring being screwed at h^1, to the under surface of the cross-bar of the moveable frame to which the couch is attached. The spindle carries at each end a lever i^1, about two feet long, and having a handle j^1; the levers are bent, after passing from under the bar to which the spring is attached, so as to rise to a level with the inner edge of the grooves in the sofa-frame, along which they lie close and out of the way when not in use, as shewn at k^1, fig. 4. When the rowing exercise is to be performed, the end flap of the couch is lowered to the ground, and the patient, seated upon a cushion, with her feet against the foot-board, grasps the handles of the levers, and, bending herself backwards, draws them with her, until her head touches the sofa behind her; she then rises, and, bending forwards to

the extent of her reach, repeats the stroke backwards, as in rowing.

In the stretching exercise, a leather belt is secured round the waist of the patient, and from it a strap descends on each side, terminating in a ring; the patient lying on the traversing cushion, as in the swimming exercise, grasps the hand-rail of the head-scroll, before mentioned; a handle is then applied to the spindle of the cylinder in the foot-scroll, and turned by the right-hand of the operator, whilst the click of the ratchet-wheel is depressed with the left: the two straps on the sheaves will be thus unwound to the extent required, in order that they may be attached to the rings of the belt round the waist; then, by reversing the action of the handle, the straps will be tightened to the required degree of tension; which the click and ratchet-wheel will maintain; and the patient, by pulling at the hand-rail, can throw any required strain upon the back-bone of her body.

The patentee claims all those parts of the apparatus, above described, as the orthopœdic sofa, which are necessary to the accomplishment of the various objects enumerated, both as regards position and exercise, in combination; and he disclaims all those parts of the sofa which are not necessary for these purposes. He further claims the prone-couch, above described, as part of the orthopœdic sofa, both separate and in combination; also the brackets which support the couch, both separate and in combination; and the apparatus for performing the rowing exercise, both separate and in combination; and the apparatus by which the sawing and stretching exercises are performed, both separate and in combination; and he disclaims the invention of any of the exercises above described, except as used in combination with the orthopœdic sofa.—[*Inrolled in the Rolls Chapel Office, March,* 1847.]

To Charles Payne, *of Whitehall Wharf, Cannon-row, Westminster, Gent., for improvements in preserving vegetable matters.*—[Sealed 29th June, 1846.]

This invention consists in impregnating wood, and other vegetable matters, with sulphur, to preserve them from decay;

and from being destroyed by insects. This is effected by employing a combination of sulphur with any substance that will form a sulphuret soluble in water, and, after such impregnation, decomposing the sulphuret, so that the sulphur may be set free from its combination, or recombined, so as to form an insoluble sulphuret within the fibre or substance of wood, or other vegetable matter.

Any convenient sulphuret which is soluble in water, such as the sulphuret of potassium, sodium, or strontium, may be employed, but the patentee prefers the sulphuret of barium, or of calcium, because the act of decomposing either of these not only sets free or recombines the sulphur, so that it will be insoluble, but also produces some other insoluble matter which may assist in preserving the wood or other vegetable matter. The strength of the solution of sulphuret must be varied according to the quantity of sulphur with which the vegetable matter is to be impregnated; when operating on wood, the patentee uses a solution considerably weaker than a saturated solution; because, if a saturated solution be used, the wood will be impregnated with too large a quantity of insoluble matter. When a solution of sulphuret of barium is used, it is made of 1.040 sp. gr.; it is to be maintained at this strength by the addition, from time to time, of the sulphuret or of a stronger solution, and it must be kept as much as possible from contact with the atmospheric air, from which it would imbibe carbonic acid, and so become gradually decomposed: the solution is made by dissolving the sulphuret in boiling water. When a solution of any other sulphuret is to be employed, the patentee makes it of such strength, that it will impregnate the vegetable matter with as much sulphur as it would be impregnated with if a solution of sulphuret of barium were used.

The mode of operating on the substance to be preserved, is as follows:—The wood, or other vegetable matter, is put into an air-tight vessel, and the air is exhausted therefrom, by filling the vessel with steam, and then condensing it by injecting some of the solution of sulphuret, and at the same time applying cold water to the exterior of the vessel. When a partial vacuum has been obtained, the solution is allowed to

flow into the vessel from the reservoir containing it, through a pipe furnished with a stop-cock; the stop-cock is then shut, and an air-pump, connected with the vessel, is worked until as perfect a vacuum as can possibly be obtained is produced in the vessel; after which, the stop-cock is opened, to allow the vessel to become filled, or nearly filled, with the solution; it is then shut, and by means of a force-pump, a further quantity of solution is introduced, until the pressure on the interior of the vessel amounts to from 110 to 140lbs. on the square inch; this pressure is maintained for about an hour, and then the solution is drawn off. The vegetable matter is now to be impregnated, in a similar manner, with an acid, or a solution of some substance or substances, in water, which will decompose the sulphuret. If sulphuret of barium or of calcium has been employed, any solution or substance may be used that will unite with the barium or calcium, so that the sulphur may be set free; but the patentee prefers a solution of sulphate of iron; and if the solution of sulphuret of barium or calcium has been prepared, of the strength above mentioned, the solution of sulphate of iron should contain one pound six ounces of the sulphate in each gallon.

In some cases the vegetable matter is dried after being impregnated with the first solution, and before it is subjected to the action of the second; particularly when the vegetable matter is required to be impregnated with as large a quantity of solid matter as possible.

The patentee claims the mode of impregnating wood, and other vegetable matters, with sulphur in a state of combination, so as to be soluble in water, and then decomposing such combination, in order that the sulphur may be set free or recombined, so as to form an insoluble sulphuret within the fibre, fabric, or substance of the wood, and other vegetable matters, as above described.—[*Inrolled in the Inrolment Office, December,* 1846.]

To William Mathers Hall, *of Leeds, in the county of York, brass-founder, for a certain improvement or certain improvements in and applicable to sliding gas-pendants, lamps, lustres, and chandeliers.*—[Sealed 22nd June, 1846.]

The first part of this invention consists in an improved mode of forming an hydraulic or gas-tight joint. Instead of employing water (which is liable to rapid evaporation) to form the joint, as is generally done, the patentee makes use of mercury or quicksilver, which is introduced between the tubes of sliding gas-pendants, and forms an hydraulic lute, or means of preventing the escape of gas, and is not so liable to evaporation as water.

The construction and form of the pendant, with the improvement adapted thereto, may be varied in several ways; particularly when the invention is applied to pendants which have been made according to the plans or methods hitherto used; but the construction which has been found to answer, in practice, is shewn in vertical section at fig. 1, Plate X. *a*, is the inlet-tube or supply-pipe, in communication with the gas main; and *b*, is an upright tube, screwed or otherwise connected to the branch or horizontal pipe of the pendant, to the ends of which the gas-burners or lamps are attached. *c*, *c*, is a tube, connected with the tube *a*, and sliding freely over the tube *b*, and within a third or outer tube *d*. The tubes *b*, and *d*, are united together at bottom by brazing, so as to form an impervious and strong joint.

The space between the tubes *b*, and *d*, is supplied with mercury or quicksilver, so that when these tubes are drawn out to the utmost length required, the surface of the mercury may always be higher than the bottom of the tube *c*, and will therefore prevent the gas from escaping. The tubes *b*, *c*, and *d*, may be made of glass, iron, copper, or other suitable material. To prevent the accidental escape of the mercury by its adhering to the tube *c*, when the pendant is drawn down, a stuffing-box *e*, is provided. The upper end of the tube *b*, is pierced with lateral holes, and is covered with an inverted cap *f*, for the purpose of preventing the accidental

splashing of mercury into the internal tube *b*. A cup *g*, is screwed on to the top of the external pipe *d*, just above the stuffing-box, and an aperture is made at *h*, in the collar of the stuffing-box, for the purpose of allowing any mercury which may have been spilt to return into the space between the tubes *b*, and *d*, and to prevent the inconvenience which would arise from the stuffing-box *e*, being quite air-tight. For ornamental lamps, a tube or casing may be added outside, or be made to enclose the tube *d*, which may, however, if desired, be made of brass or other ornamental material.

Another improvement consists in the use of a tube of flexible or elastic material in the construction of sliding gas-pendants, so as to form a continuous flexible tube, in connection with the rigid metallic tubes of the pendant; so that the moveable parts thereof may be raised, lowered, or extended, without its being necessary to use any hydraulic lute.

The construction of a pendant, and the arrangement of its parts, according to such last-mentioned improvement, may be varied according to taste and circumstances; but a convenient form and construction, which has been found to answer in practice, is represented in vertical section at fig. 2. *a*, is the supply or inlet-tube, which communicates with the gas main; *b*, is a short pipe or tube, in communication with the horizontal arms of the gas-burners of the pendant; *c*, *c*, is a tube, connected at one end to the supply-pipe *a*, and at the other to a flexible tube *p*, which is made of vulcanized India-rubber, or any other suitable material. The opposite end of the flexible pipe *p*, is fastened, in any suitable manner, to the short pipe *b*; and, in order to prevent the passage for the gas from becoming contracted when the flexible pipe *p*, is bent, a string or strings, or a coil of catgut, wire, or other suitable material, should be inserted in the flexible tube *p*, so that, when the slide is closed, the folds may be more regular, and the tube less liable to be closed by being bent into acute angles. It is stated that a simple string, a little longer than the tube *p*, will be sufficient to obviate these difficulties and objections. *s*, is a vase, which may be made of an ornamental form, and is suitably attached to the tube *d*, which is made to slide freely over the tube *c*. The lower part of the

pendant, and the parts thereto attached, are supported by any of the well known methods of counterpoising the same, or according to the improvements hereinafter described. It is preferable that the vase *s*, should be so attached to the lower part of the pendant at *i*, and to the tube *d*, that it may be easily removed, for the purpose of inspecting, removing, or renewing the tube *p*, when necessary.

A further improvement consists in the use of a tube of elastic material in the construction of sliding gas-pendants, so that such tube may serve as a spring for supporting, or partly supporting, or counterpoising the moveable part of the pendant; and also as a continuous extensible tube, for the due supply of gas when the pendant is drawn down.

Fig. 3, is a vertical section of the pendant. *a*, is the supply-pipe or inlet-tube, communicating with the gas-main; and *b*, is a tube, connected to the horizontal pipe which carries at each end the gas-burners of the pendant; *c*, is a tube connected to a tube or supply-pipe *a*; and *t, t*, is a small tube, forming a continuation of *c*; *p, p*, is an elastic tube, made of vulcanized India-rubber or other suitable material, tied or otherwise firmly secured to the tubes *b*, and *c*, at *q*, and *r*, so as to form air or gas-tight joints; *u, u*, is a tube, partly inclosing the flexible tube, and having a shoulder, upon which a plunger or plug is formed, and made to work with a moderate degree of friction within the external tube *d, d*. The elastic tube *p, p*, is made of such size and strength as by its elasticity to sustain the weight of the pendant, or thereabouts; but as this cannot be very accurately proportioned, and may vary according to temperature, the piston or plug at *v*, by its friction, sustains a part of the weight, or resists the tension of the elastic tube, as the case may be. If the pendant be very heavy, a friction or stuffing-box may also be added at *l*, or weights and pulleys may be used in aid of the elasticity of the tube.

It may be observed that the small inner tube *t*, is useful in preventing the elastic tube from collapsing upon itself, but is not absolutely necessary; and that if a plunger or stuffing-box be used, suitable apertures must be made in the tubes *d*, and *u*, to prevent the inconvenience which would arise from

such plunger or stuffing-box working air-tight. The tube *d*, is attached to the bottom of the pendant, in such a manner that the parts may be readily detached, for the purpose of inspecting or repairing the elastic tube or any of the internal parts. Elastic materials, similar to caoutchouc, might be used as a spring for supporting or partly supporting the weight of sliding gas-pendants (without being at the same time used as an air-tight tube), in various ways, which it is unnecessary here to describe, as any gas-fitter, or manufacturer, acquainted with the construction of pendant burners, will be fully able to carry out the principle of the above improvement, so as to suit different circumstances and cases.

Another part of the invention consists in suspending or counterpoising the moveable parts of sliding gas-pendants by means of two or more pulleys, so that the mechanical power of the weight or weights, or other counterpoise, may be doubled or further increased. The mode of carrying out this improvement is shewn in elevation at fig. 4. The gas-pendant may be constructed according to the methods now well known, or according to one of the before-mentioned improvements. In order to suspend or counterpoise the pendant, the upper part of the external tube *d*, is provided with two short arms, carrying pulleys *w*; and to the hollow rod or tube *c*, is attached an horizontal arm *x*, at the extremities of which pulleys *y*, *y*, are mounted; the cords or chains *z*, *z*, *z*, are attached to the arm *x*, at *g*, and pass under the pulleys *w*, and over the fixed pulleys *y*, *y*, and carry, at their pendant ends, the weights *j*, as shewn in the figure.

Although one series only of weights and pulleys are shewn, it will be easily understood that two, three, or more series of weights and pulleys may be used, if required.

The last part of the invention consists in making use of the weights, or part of the weights, for counterpoising sliding gas-pendants, as a shade above the burner or burners thereof; this will be readily understood by reference to fig. 5, in which *o*, *o*, represent shades suspended over the gas-burners, and attached to and forming part of the counterbalancing weights *j*, *j*; the other parts of this plan are similar to those described in the last improvement, and therefore no further explanation will be necessary, except to say,

that the shades *o, o,* may be made of glass, china, metal, or other suitable material, and may be adapted either to the ordinary sliding gas-pendants, having balance-weights, or applied in combination with the other improvements, hereinbefore described.

The patentee remarks, that although, to avoid confusion, he has shewn and described all his improvements separately, yet it will be evident to any intelligent manufacturer, that certain of them may be used in combination with each other, and also that others may be used in connection with the old constructions of gas-pendants; he therefore wishes to reserve to himself the right to use any of them, separately or in combination.

In conclusion, he claims, Firstly,—the use of mercury or quicksilver, as an hydraulic lute, in sliding gas-pendants, in place of water, which is usually employed. Secondly,—the use of a tube of flexible or extensible materials in the construction of sliding gas-pendants, so as to form a continuous tube in connection with the metallic tubes of the pendant, so that the moveable parts thereof may be raised, lowered, or extended, without the necessity of using any hydraulic lute. Thirdly,—the use of a tube of elastic material, in the construction of sliding gas-pendants, so that such tube may serve as a spring for supporting, or partly supporting, or counterpoising the moveable part of the pendant, and also as a continuous extensible tube for the due supply of gas; and he also claims the use of India-rubber or caoutchouc, or similar vegetable substances, or preparations thereof, as springs for supporting or partly supporting the moveable parts of gas-pendants, although such last mentioned material may not be in the form of tubes, or be used for the passage of gas. Fourthly,—the use of a series of two or more pulleys for increasing the sustaining power of the counterpoise of sliding gas-pendants, as shewn at fig. 4. Fifthly,—employing the shades, which are usually suspended over the flame, as weights, or part of the weights, for counterpoising sliding gas-pendants.—[*Inrolled in the Petty Bag Office, December,* 1846.]

Specification drawn by Messrs. Newton and Son

To Maximilian François Joseph Delfosse, *late of Paris, but now of Regent-street, in the county of Middlesex, Esq., for improvements in preventing and removing incrustation in steam-boilers.*—[Sealed 25th August, 1846.]

This invention consists in preventing and removing incrustations in steam-boilers by the addition to the water used therein of a certain mixture which acts on the precipitable matters contained in the water in such a manner as to prevent their forming any incrustations on the interior of the boiler, and which will also remove any incrustations that may have been previously formed.

The mixture is termed by the patentee the "antipetrifying mixture;" the materials composing it are, first, dry tannic or gallic extract, obtained from the bark of oak and other trees, or from gall-nuts or roots, or from any other substances containing the same; secondly, hydrate of soda, or soda deprived of its carbonic acid; thirdly, muriate of soda; and fourthly, subcarbonate of potash. The proportions in which these ingredients are used, and the quantity of the mixture employed, will vary with the greater or less impurity of the water, and according as the boiler is stationary or locomotive. If the boiler is a stationary one, and it is fed with fresh water, the amount of antipetrifying mixture required for 336 hours' consumption per horse-power may be made by mixing together twelve ounces of muriate of soda, two ounces and a half of hydrate of soda, two drachms of the dry tannic or gallic extract, and half an ounce of subcarbonate of potash: for locomotive boilers, travelling on an average about 140 miles each day, the quantity of the mixture per horse-power is increased one-fifth. If the water should be brackish, or a mixture of salt water and fresh (such as the water of tidal rivers), the patentee omits the muriate of soda, and uses six ounces instead of two and a half of hydrate of soda, and five drachms instead of two of the dry tannic or gallic extract; the mixture is also prepared in this manner when sea-water is used in the boiler. The patentee prefers to introduce the mixture into stationary boilers in quantities sufficient for

two, three, or more days; but locomotive and marine boilers are to be supplied daily with a portion of the mixture, corresponding with the amount of duty to be performed. The mixture may be introduced into the boilers of stationary engines, and into either the feed-tanks or boilers of marine engines; but for locomotive engines, it is better to add a portion daily to the water in the tender.

The patentee claims the employment, for the prevention and removal of incrustations or petrifactions in steam-boilers, of the antipetrifying mixture above described, and of any analogous mixture, containing for its principal or essential ingredients fixed alkaline matter combined with tannic or gallic extract.—[*Inrolled in the Inrolment Office, February,* 1847.]

To Richard Clarke Burleigh, *of the city of Bath, in the county of Somerset, Gent., for certain improvements in artificial light.*—[Sealed 28th August, 1846.]

In order that the nature of this invention might be rendered evident, the patentee has given a few preliminary remarks on the nature and properties of solar and artificial light.

He states, that in solar light three colors or rays are so combined as to yield in transmission through the azure-colored medium of the atmosphere, a perfect or colorless light; that is to say, those luminous rays which emanate by radiation from the sun, and reach the earth, consist of three primitive colors, red, yellow, and blue, combined in proportions that form a compound ray, having no predominating tint. Solar light, therefore, or the luminous rays emanating from the sun, being, by composition, the purest and most perfect of any with which we are acquainted, such light must necessarily be the standard of comparison to which every other kind of light is to be referred, in judging of its quality and effects.

Now the difference between the illuminative effects and qualities of solar or natural light and of that produced by artificial means will be found to consist principally in this, viz., that in the artifical spectrum, the red and yellow portions or rays greatly predominate over the blue; that is to

say, the former are present or emanate from the source of artificial light in quantities over and above such as are required for a just and harmonious combination with the blue rays, to produce a perfectly colorless light, similar to solar light. This excess of red and yellow rays may not only be proved by the prism, but as they appear to emanate in a free or uncombined state, they can be recognised as a positive tint, overlaying all objects on which they fall; hence arises the difficulty or inability of ascertaining with precision delicate shades of color by artificial light; and the excess of these red and yellow rays also causes pain and fatigue to the eye, when long exposed to its influence.

This excess of color existing in the artificial spectrum, the patentee proposes to correct, by transmitting the rays of artificial light through glass, so prepared as to present, when formed in a proper manner, a medium analogous to that presented by the azure tint of the atmosphere to solar or natural light. By the employment of this invention, which the patentee terms "achromatic glass," the following improvements are said to be gained:—The quality of artificial light becomes greatly improved as to purity, being more or less deprived, at pleasure, of its excess of color, and consequently of its disagreeable and painful glare; its powers of diffusion, and the ability to ascertain by it delicate shades of color correctly are greatly increased; the shadows thrown by the objects exposed to its rays are transparent, grey, and cool; thus altogether differing from the hot and brown opacities forming the shadows of incorrected light; and lastly, the points most highly illuminated by the corrected light are brilliant, pure, and of true tone, in place of being loaded with a glaring and unnatural ruddiness.

Of the quality and source of the achromatic power.

It is a law of light, that when luminous rays are transmitted through a colored medium, a certain proportion of the rays complementary to the color of the medium presented shall be neutralized, or so disposed of as not to be in active and visible agency as portions of the light transmitted. Thus, if light be made to pass through ruby-tinted glass, it will appear

ruddy, because the ruby tint, neutralizing the colors complementary to its own hue, namely, the yellow and the blue, allows the red to predominate in radiation; yellow-tinted glass will also neutralize the blue and the red ray; and blue-tinted glass, the yellow and the red.

From this it will be evident, that inasmuch as the excess of color to be corrected in artificial light exists in the red and yellow portions of the artificial spectrum, the base of the material or compound possessing such power of correction must always be such as shall impart to glass a blue tint or tinge of color; and such tint or color will, within certain limits, always be a warranty and assurance that the glass so tinted possesses achromatic or purifying properties with regard to artificial light.

The material now in general use for the purpose of imparting a blue color to all vitrifiable substances, viz., cobalt, in those states of preparation known as "smalt" or "azure blue," and "zaffre," imparts to glass the power of achromatizing artificial light with certainty. The lightest appreciable tint that can be given to glass by these preparations of cobalt, (that is to say, a tint or tinge but just or barely visible to the eye when the glass is in the form adapted to use) renders such glass achromatic, or a purifier of artificial light, by imparting to it the power of correcting some certain portions of the degree of color existing in its spectrum; and from this, the lightest appreciable tint or tinge of color (which is called the lowest achromatic power), a succession of powers may be obtained, by a gradual increase in the proportion of the achromatizing material added, and, consequently, in the depth of tint, until that point or power be reached which forms the natural boundary of their range; that is to say, a point or power by which all excess of red or yellow color in the emanating rays is neutralized.

It is manifest that the range between the lowest and the highest achromatic powers is capable of numerous divisions into progressive degrees or intensities, each of which will be found to possess some peculiar quality that renders it most desirable, according to the required effects of illumination; such effects commencing at the lowest, and ending at the

highest attainable point or degree of improvement. Thus, the exact tint or power sought in any particular instance will depend on the judgment of the manufacturer, guided by the considerations of the nature of the medium required, as to form and thickness, and the character and quality of the light previous to correction; while the exact quantity of achromatizing material added, to obtain the required result, will depend on its purity and strength as a coloring agent, and also upon the peculiar character of artificial light to be corrected or achromatized.

The following are the tests for determining the point of highest achromatic power:—The corrected artificial light to be tested being enclosed in a fitting box or lantern, let a direct ray fall on a white substance, as paper, side by side with a direct ray of a warm sunlight (as of a summer noon), in a room to which no other ray of light has access. So long as the ray of corrected artificial light is of a warmer or ruddier quality than the ray of solar light, the achromatic power is short of its highest intensity, and therefore within the range of true achromatic powers, or further and more perfect correction. If the artificial light appear colder or bluer, the medium is too deeply tinged, and is not an achromatic but a colored medium, applicable in no way to the improvement of artificial light by the correction of the excess of colored rays emanating therefrom. If the qualities of the respective rays be the same, then it will be evident that the highest point has been reached, and the medium is at its highest available power or state.

It is scarcely necessary to state, that the nearest approach to the correction of the artificial spectrum fails to produce a light in all respects identical with sunlight; a point may indeed be reached, beyond which the corrected light ceases to improve in purity, as compared with the ray of sunlight; but the essential difference in the two sources of light, as to intensity of combustion, powers of radiation and penetration of refrangibility, distance of source, and nature of the respective media interposed, must prevent the attainment in corrected artificial light of many qualities whieh exist in the luminous rays emanating from the sun; but that there is a visible and

positive improvement in the quality of the artificial spectrum by transmitting the artificial rays through the achromatic or purifying medium, presented under the form of an achromatic argand chimney or glass, is evident; and that such improvement is caused by means analogous to those which render solar light so perfect, can be demonstrated by practical experiment.

The achromatizing material, though necessarily producing a blueish tinge in the glass containing it, as evidence of its presence, cannot be considered a coloring agent merely, but is an essential constituent of achromatic glass,—a constituent on the presence of which, in proper proportions, absolutely and entirely depends the existence of those qualities which render the glass achromatic and permit its successful application to artificial light. With the exception of the achromatizing material, the ingredients of achromatic glass in no respect differ from those of glass employed in the manufacture of articles such as chimneys, globes, bulbs, shades, or other shapes, which are usually employed to protect artificial light from the influence of currents or draughts of air or other disturbing causes; or to create the proper currents of air that may be necessary to maintain perfect combustion.

The degree of intensity of color which will be required to correct the colored rays of artificial light having been ascertained in the manner herein described, the manufacturer will be at no loss to impart the proper tint to the glass, by the admixture of a suitable quantity of the achromatizing ingredient. The molten metal having been properly prepared, glasses of various shapes and forms may be made by the workman to suit different kinds of burners, such as plain, straight, or other shaped chimneys, bulbs, globes, shades, or glasses of various kinds, as circumstances or cases may render desirable or necessary, or taste may direct.

In place of mixing the achromatizing material with the ingredients of which the glass is composed, so as to cause them to enter and pervade the mixture of vitrified matters, the patentee sometimes cases uncolored glass with blue or colored glass of a proper tint; or he stains the surface of uncolored glasses, made in the ordinary manner, taking care to

impart the proper tint for correcting the colored rays of light. This operation is performed in the ordinary manner, and with the materials usually employed for painting or staining glass. The colored rays of artificial light may also be, to a great extent, corrected by reflection, by employing shades or reflectors made of porcelain or semi-transparent glass, the reflective surfaces of which should be stained, painted, or colored blue of the proper tint.

In conclusion, the patentee remarks, that he is aware of glasses having been heretofore stained of various colors, and employed for the purpose of ornament, or for imparting various hues or colors to objects which have been illuminated by light passing through them; he does not therefore wish to claim, generally, the employment of variously colored glasses; but he claims, First,—the improving of artificial light by the application of glass composed of the substance or substances usually employed, or any other analogous ones suitable for this manufacture, with the addition of a material which, when in union with the vitrifiable matter or glass, or painted on, laid over, or made to cover the same, shall produce or impart a shade or tinge of a blue color of a varying depth, according to the ratio or proportion in which the said coloring material is added, painted on, laid over, or made to cover the other usual and well known ingredients necessary to the formation of glass; whereby the rays of artificial light may be purified or corrected, as above explained. Secondly,—the use of colored shades or reflectors, as above set forth, in which the reflecting surfaces are colored, tinted, stained, painted, or covered with some achromatizing material, for the purpose of correcting the colored rays of artificial light. Lastly,—the application of such achromatic glass or reflector, in combination or union with any form or shape that may be employed for the purposes above mentioned,—or which may be suitable for shading, or protecting, or reflecting artificial light from currents or draughts of air,—or for producing and guiding such artificial currents of air to the flame, as may be found necessary to produce a perfect combustion of the matter yielding such light.—[*Inrolled in the Petty Bag Office, February*, 1847.]

To George Senior, *of Bradford, in the county of York, Gent., for certain improvements in washing, cleansing, scouring, and bleaching silk, cotton, wool, and other fibrous substances generally; also in dyeing, combing, carding, spinning, felting, milling, or otherwise treating or preparing fibrous substances generally.*—[Sealed 3rd September, 1846.]*

This invention consists in the use of certain solutions or baths, instead of those commonly employed for washing, cleansing, scouring, and bleaching wool.

The mode of carrying out the improvements is as follows: The wool is first steeped in a bath composed of from one to two pounds of carbonate of soda, from two to three quarts of rice water (prepared as hereafter described), and eighteen gallons of water heated to 60° or 70° Fahr.; and in this mixture the wool is allowed to remain from five to ten minutes, according to its condition;—the above proportions are sufficient for twenty-four pounds of wool. The quantities of carbonate of soda and rice water employed vary according to the state of the wool; if it be much stained, greasy, and dirty, the larger quantities (two pounds of the former and three quarts of the latter) are used; if it be not much stained, and not very greasy and dirty, the smaller quantities above mentioned (one pound of the former and two quarts of the latter) are used; and intermediate proportions may be employed, according to the state of the wool operated upon. When the wool is taken from the bath, it is dried by passing it between rollers, as in the ordinary method of cleansing wool; and is next immersed in a bath composed of one pound of carbonate of soda, two quarts of rice water, and sixteen gallons of water heated to 60° Fahr. The wool is allowed to remain in the bath for ten minutes or a quarter of an hour, or until it

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* By a disclaimer, dated March 2nd, 1847, the patentee has struck out from the title of his patent, the words "silk, cotton, and other fibrous substances generally; also in dyeing, combing, carding, spinning, felting, milling, or otherwise treating or preparing fibrous substances generally;" so that the title now stands "for certain improvements in washing, cleansing, scouring, and bleaching wool."

appears to be sufficiently cleansed; and then it is dried by passing it between rollers.

When the wool is of the kind known as "greased wool," it is prepared for the above operation by immersing it in a bath consisting of one pound of slaked lime and eighteen gallons of water heated to 60° or 70° Fahr., in which it is allowed to remain for ten minutes; and it is then dried by passing between rollers. The cleansing of the wool is afterwards completed by the processes above described.

The rice water is made by boiling five pounds of yellow East India rice, ground to a fine powder, and one pound of carbonate of soda in sixteen gallons of water for about an hour, and then straining the liquor through a sieve. The rice water should be used within three or four days after it is prepared, or before fermentation takes place.

The patentee claims, Firstly,—the use of rice water in the washing, cleansing, scouring, and bleaching of wool; and, Secondly,—the use of lime in the washing, cleansing, scouring, and bleaching of wool; whether the said rice water and lime be used in the manner above described, or in any other manner.—[*Inrolled in the Inrolment Office, March,* 1847.]

Scientific Adjudication.

THE ELECTRIC TELEGRAPH COMPANY v. NOTT AND OTHERS.

Before the Lord Chancellor, at Lincoln's Inn, Wednesday, February 24th, 1847.

JUDGMENT.

The Lord Chancellor.—The great importance of this matter to the parties, and the very interesting nature of the subject-matter in contest between them, may very well explain the great zeal which has been manifested in the discussion of this question; but when the facts of the case are applied to the established rules of this court, there really is no difficulty whatever in coming to the conclusion as to the course it is my duty to take.

Now I have frequently had occasion to express my opinion as to the course that this court ought to take in cases in which applications are made for the exercise of the equitable jurisdiction

of this court, by way of injunction, where it is in aid of the protection of a legal right. I have said (and, in saying that, I have not departed from the principles of any of my predecessors), that where the court is applied to to protect a legal right, if there be doubt as to the validity of the legal right, that it becomes this court to be extremely cautious in administering its equitable jurisdiction,—and that for two reasons: because, if the legal right ultimately fail, the court then has interfered without any authority whatever; it being merely derivative, and in aid of the legal right;—but, secondly and principally, because there is no comparison between the evil of an error in this court, upon the question of a legal right in refusing or granting an injunction. If an injunction is improperly granted, it creates infinitely more mischief to the defendant than a mere delay of granting it can possibly, in ordinary cases, affect the plaintiff; and therefore I have said, that, in those cases, I thought it became the duty of the court to be extremely cautious, and not to give its aid by injunction, unless it felt well satisfied that in the result the legal right would be established.

For the purposes of the argument it has been stated, that I have carried that doctrine further than my predecessors. I can only say, that in looking back to what Lord Eldon has done, I have never had occasion to carry it anything like so far as Lord Eldon has laid down the rule; for in the case of *Hill* v. *Thompson*, which for another purpose has been cited against this course of proceeding, I find Lord Eldon laid this down, that if a patent be new, and has not acquired the sanction of enjoyment, the court will not exercise its own judgment upon the subject until the party has established his right at common law.

I have not had occasion to consider how far I might or might not be disposed to carry the doctrine to that length, but, beyond all doubt, the doctrine there laid down goes a great deal further than in any case which has occurred before me. That undoubtedly is open to this exception, an exception which Lord Eldon has laid down frequently (I dont mean that he has introduced it), and upon which I, myself, have frequently acted, but which does not in the slightest degree interfere with the other rule, which is quite independent of that, namely,—that where a patent has existed for some time, and there has been a user under that patent, it is an assertion of a title against all the world, and during the period it has been exclusively enjoyed, is strong corroborative evidence of the validity of that right; and the court has said, and acted upon it, in *Hill* v. *Thompson*, that under these circumstances, the court will give so much of the sanction to the right asserted by the patent, as to protect it until it be proved to be invalid. I have adopted the same rule, but what possible reference has that to the rule where it is not a question of the validity of the patent, but where, assuming the legal right to be free from doubt, other circumstances make it ex-

tremely doubtful, whether the plaintiff has a legal right and title, as against the defendants.

Now, for the present purpose, without at all entering into the question which has been discussed, as to how far the plaintiff's discovery was novel,—in short, as to whether he has or has not a legal right to the discovery found in the specification,—I will assume all that is free from the possibility of doubt, and that the plaintiff has a right to all which he appears to be protected in by the patent, because then he stands precisely in the same situation as any other person having an acknowledged right; as, for instance, a party having a copyright, there is no question of the right that the party has a copyright to his own composition (generally speaking, of course): if he copies another man's book he cannot have a copyright, but if it be an original composition at all, no question can be raised as to his having a copyright. Then the question is, whether he has or has not pirated that copyright by the use he has made of that publication. That frequently occurs, and those cases have occurred before myself, and many of the observations I have made upon this subject are to be found in cases of copyright.

I put the owner of a patent in the same situation as the owner of a copyright,—there can be no legal doubt, for the present purpose, as to the validity of the right; then comes the question, whether the rule, which Lord Eldon has laid down, and all other judges have laid down, and which I have recognized and acted upon, is applicable to the present case; whether, assuming there is no doubt to the plaintiff's right, I felt certain that the defendant has subjected himself to the consequences of a violation of that right by the act which he has done, and which is brought before me:—Why it would be rather a rash thing, independently of any other opinion which I may have formed from what I myself have seen and heard,—it would be rather a rash course to take, to come to that conclusion in the face of the evidence and opinion sworn to by some of the most eminent people in this country, opposed, no doubt, by the evidence of persons of equal eminence on the other side; but they might balance very well if I were bound to draw the line between them. But when I am considering whether the question is so free from doubt as to make it proper and desirable for me to interfere with what the defendant has done, until the plaintiff has established at law that he is infringing what he says is his right, I should be acting upon my own opinion, as against the opinion of some of the most eminent people, and the most scientific people in the country, who tell me there is no violation at all;—that according to all the rules of principle, which those conversant with mechanics know and follow, that it is perfectly new, and although it uses the same materials, and although it applies the same principles, yet in point of fact it is new.

Now I am not saying those gentlemen are right, or the other

gentlemen are wrong; but I am considering whether, according to the rule I have laid down, and which has been laid down by those who have preceded me, this is a case so free from doubt as to come within that rule, to justify me in interfering until the legal right be ascertained. I am desirous to put it upon that, and I am desirous of avoiding expressing any opinion of my own upon what I have seen; because, although it is not very likely that any opinion of my own would have any material effect, yet, as the matter is to be tried, I think it much better for those who have heard the discussion, in the first instance, to leave it untouched, for decision by those before whom it must ultimately come to be decided.

I put it, therefore, upon the evidence of those eminent persons to whose affidavits I have alluded, certainly not giving a strong opinion myself in opposition to the views they have expressed; but I abstain from stating to what conclusion my mind leans upon the subject, yet it is in a state of doubt and difficulty, which, if I were called upon to solve, I might find great difficulty in solving; but I own the question is,—whether it be so free from doubt that I have arrived at a reasonable certainty as to what the result of the trial at law would be?

It comes within the rule of *Hill* v. *Thompson*, and various other cases, to which I have adverted, in which I have thought it the duty of this court to abstain from interfering till the legal right has been established. I think the Vice-Chancellor has come to the right conclusion, and the party must establish his title at law before he comes here to ask the court to exercise its equitable jurisdiction.

The motion must be refused with costs.

Scientific Notices.

On a new mode of constructing railways by the employment of cast-iron chairs and wrought-iron sleepers,—being a Report made in the name of the Committee of Mechanical Arts, by M. Vauvilliers, on the plan proposed by Messrs. Bessas-Lamégie and Henry, for superseding wooden sleepers.

(Translated for the London Journal, from the Bulletin de la Société d'Encouragement.)

In the early period of railways, the cast-iron chairs for holding the rails were supported by blocks of stone, and in some instances, on embankments which had not been allowed sufficient time to settle, the chairs were fixed upon wooden sleepers, preparatory to the completion of the embankment.

This exception has, however, become the general rule; the stone blocks are seldom used, on account of the difficulty of fix-

ing the chairs, and wooden sleepers are almost universally employed. Longitudinal wooden sleepers have also been proposed and employed in some instances, but have not been generally adopted.

The expense attendant on wooden sleepers is very great, from the continually increasing price and scarcity of wood, and also by reason of its rapid deterioration when buried in sand. It is also very difficult to fix the chairs properly by pins, as they rust and eat away the wood.

M. M. Bessas-Lamégie and Henry have submitted to the Society of Encouragement a plan in which, instead of the wooden sleepers and moveable cast-iron chairs at present employed, two cast-iron plates are used, thirteen inches in length and fifteen in width. The chairs, which are of the ordinary form, are cast in one piece with these plates. The rails are kept at the requisite distance apart by means of a cylindrical wrought-iron rod, about an inch in diameter, which passes through the chairs a little below the rails, and is held fast therein by means of vertical pins, which are prevented from rising by the rails being in immediate contact with them.

The plates are prevented from slipping in a longitudinal direction by means of grooves cut in their under side, and this is further assisted by the whole being covered with earth as high as the base of the rails. This improved plan is shewn in Plate X., fig. 1, being an end elevation of the iron plate and chair, and fig. 2, a cross section of the same. *a*, is the cast-iron plate, having feathers underneath which indent the ground and prevent the plates from slipping; *b*, is the chair cast on the plate *a*, and in it the rail *c*, is fastened by a wooden wedge; *d*, is the cross rod for maintaining the rails at the requisite distance apart, and is, as before stated, fastened to the chairs respectively by vertical pins *e*.

The members of the Committee of Mechanical Arts proceeded last summer to inspect those portions of the Versailles Railway where this plan had been adopted; the parts selected were those most calculated to test the merits of the new plan. The extent laid down upon this plan was about seventy yards, and it had been continually traversed since January 1846.

The result of the inspection was very satisfactory, as the whole of this portion of the line appeared in good condition, and the plates and cross-rods were free from rust, although buried six inches deep in sand. To make the advantages of this system more evident, it would, however, be desirable to lay down two or three hundred yards of rail continuously, when the following beneficial results would appear from using the cast-iron plates for sustaining the railway chairs:—Wood work, which is expensive, and not very durable, would be dispensed with,—a saving of about 1*s*. 6*d*. per yard would be effected,—a less quantity of earth would be required to be displaced when re-adjusting the chairs,—

a firmer way would be obtained,—and the construction would be much simplified. Wooden sleepers are liable to warp and shrink, and get out of place, and, on a train passing, they will rise, and thus the rails will become loosened.

In some instances, where there is not room for an adequate thickness of ballast upon and near the crowns of arches, cross sleepers of iron have been employed in connection with the chairs ; but only three or four have been laid together in this manner, as there was no dependence to be placed upon them. The plates proposed by M. M. Henry and Bessas-Lamégie offer every security in this respect.

Iron sleepers have been used with advantage in the construction of railways employed in smelting works, for transporting incandescent matters, which would burn the wooden sleepers. Plans analogous to this have been proposed at various times without having been put in practice.

Report made by M. Bussy, in the name of the Committee of Chemical Arts, upon a new process for silvering looking-glasses, by M. Tourasse, Rue Neuve Saint-Marc.

The process of "silvering" glass, as at present practised, consists in spreading upon a smooth stone, placed horizontally, a sheet of tin, upon which a sufficient quantity of mercury is poured to cover it; the glass to be silvered, after being perfectly cleansed, is laid over the tin, and moved about, in order to drive off the excess of mercury, and prevent any air-bubbles being formed between the glass and the metal.

The glass being now charged with weights, the amalgam adheres sufficiently to enable the glass to be placed in a vertical position, and on being kept for some time in that position, the excess of mercury will run off, and in five or six days the amalgam will have settled sufficiently to allow the glass to be removed.

This process, of the origin of which we have no precise information, does not appear to have undergone much modification since its first introduction; but it leaves much to be desired, both as regards the difficulty of its application, under certain circumstances, and the quality of the product; for instance, its application is very difficult to curved and irregular surfaces; so much so, that in those cases alloys or amalgams of a more or less fusible nature are employed; but the small refractive power possessed by those alloys, and their dull and somewhat leaden tint, prevent their being advantageously employed, and it is extremely difficult to obtain the curved mirrors necessary for optical purposes.

Another disadvantage attending the mercury amalgam is the separation of a portion of the mercury a long while after the completion of the silvering process, especially if the glass be

exposed to a rather high temperature; in which case, the mercury accumulates at the bottom of the glass, and on turning it upside down, the mercury will run back again, and produce marks and flaws on the surface, or what is commonly called "frost."

The action of too powerful a light produces also a sort of crystallization in the amalgam, which destroys its reflective powers, and produces a granulated or frosty appearance upon the glass; this defect is especially observable in optical instruments, which are exposed to the direct action of the sun.

The process to which M. Tourasse has called your attention was put in operation before the members of the Society at one of its late sittings; it consists in pouring upon the glass (placed in a horizontal position and perfectly cleansed) a solution of nitrate of silver, mixed with a certain quantity of ammonia and a volatile oil, which the inventor calls *oil of quassia*. After being in contact for some time (the duration of which varies, but does not generally exceed an hour) the solution which floats upon the deposit of silver is poured off, and also the excess of nitrate of silver, and any essential oil remaining: the glass is afterwards dried. It will be seen that by this method the most irregular figure may be silvered as easily as plane surfaces.

This process, for which a patent was taken by Mr. Drayton,* and afterwards transferred to M. Tourasse, is merely the reproduction, upon a large scale, of a chemical experiment which was made some time since; it is the reduction of silver to the metallic state, as performed by M. Liebig, by means of *aldehyde* and ammonia. Your reporter himself obtained an analogous effect by means of the volatile product produced by the distillation of castor oil. This process, however, which appears so simple, and so easily performed, nevertheless cost much time and trouble before it could be put into operation effectively on a large scale. From the specimens submitted to the Society an idea may be formed of the degree of perfection arrived at by M. Tourasse; and there is no doubt that the process may be employed with equal success for all sizes of articles used in commerce.

This new process of silvering possesses the advantage over the ordinary method, of reflecting the light more completely; which was proved by frequently comparing two portions of glass, the one silvered by the ordinary method, and the other prepared according to the improved plan.

We regret that we cannot, in support of this, give an exact account of the difference existing between the two in respect of their reflecting qualities. We have not been able to make any precise experiments thereupon, but we have taken advantage of the practical experience of a man of well known talent, M. Charles Chevalier, who was rewarded by the government for his skill in

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* For report of his specification, see Vol. XXIV., p. 421, London Journal.

the manufacture of optical instruments. He does not hesitate to award great superiority to the improved process, as regards the production of more perfect reflection, and he thinks that it would be very advantageous for optical instruments.

If the improved process be considered as regards general economy, its superiority will be evident, inasmuch as it diminishes the consumption of mercury, which is extensively used in various branches of manufacture, and has risen in price considerably during the last few years.

According to the ordinary plan a square yard of glass costs about 3*s.* 6*d.* to silver, while by the improved plan the silver to operate upon the same quantity only costs about 1*s.* 4*d.*

There is another advantage possessed by this process over the old method, which concerns the health of the workmen. By the ordinary process the health of the workmen is seriously injured, as is the case in all other branches of the arts where mercury is used, such as in gilding, skin dressing, &c. Everybody knows the maladies and infirmities to which gilders are liable, viz., emaciation, nervous trembling, weakening of the intellectual faculties, and all the symptoms of premature old age.

There is, however, one disadvantage attending this process, which is the possibility of the layer of silver undergoing a chemical change from contact with the atmosphere, more or less charged with sulphurous matters. In order to avoid this, M. Tourasse employs a peculiar kind of varnish, which he lays over his silver, as is ordinarily done with mirrors for nautical instruments, and which without this precaution would soon become unfit for use, by the injurious influence of the damp air, charged with vapours from the sea.

In order to test the preservative properties of this varnish, a silvered plate (a portion only of which was varnished) was exposed during four days to the action of sulphuretted hydrogen gas. By this experiment it appeared that the part not varnished had turned yellow, lost its reflective properties, and was flawed in several places, while the varnished portion remained perfect. It would, no doubt, be premature to conclude from these experiments (although made under circumstances calculated to test the value of the invention) that this invention will entirely prevent mirrors from being injured from exposure; this can only be satisfactorily proved by experience; and if, in course of time, the favorable opinions formed be confirmed, this discovery is one of the finest applications of a chemical principle ever made known; for by it we shall not only obtain better looking glasses for domestic purposes, but a great improvement will also be effected in optical instruments; and, lastly, the health of the workmen will not be injured.

On the Theory of the Resistance of Fluids.—Solution of the paradox proposed by M. D'Alembert, and comparison of the theory, with experiments.

BY M. DE SAINT VENANT.

IN order to understand this question properly, it will be necessary to refer to the singular analytical results which stopped Euler and D'Alembert, when they attempted to solve it.

D'Alembert, in his Treatise (vol. v., p. 1768), says, that "when a solid immoveable body, composed of symmetrical parts, is entirely immersed in a fluid, constantly in motion, it will be seen, on having recourse to hydrodynamic equations, that there are equal and opposite actions before and behind the body immersed :" the impulse given to such a body, or the resistance which it would meet with from the fluid on moving, would therefore absolutely amount to nothing ; which singular paradox he leaves to be solved by geometricians.

This difficulty had occurred to him when he composed his *New Theory of the Resistance of Fluids*. It had, however, occurred to Euler, as far back as 1745 ; and after endeavouring to get over it, by taking a kind of mean between the new theory and the vulgar one, that great analyst finally adopted the latter, although contradicted by a number of facts.

It will be seen that this paradox exists with bodies of all forms, whether symmetrical or not, provided the fluid in which it is immersed answers to the ordinary equations founded on the supposition that the pressure is equal in all directions, and normal to the solid or fluid faces on which it is exerted. It is only necessary, in order to ascertain this, to consider the simultaneous movement of the body, and of a portion of the fluid contained in a prism, and to give an equation of the acting forces for the motion relatively to the surrounding fluid, the movement of which is supposed to be constant and uniform.

If the movement has, as is supposed, become permanent, the active force acquired each moment becomes inactive ; the exterior pressure also becomes inoperative, and it is the same with the interior pressure of the fluid, the density of which is not presumed to undergo any change. The impulsive action of the fluid upon the body will consequently amount to nothing.

A different result will, however, be obtained, if, instead of the ideal fluid whereon the calculations of the geometricians of the last century are founded, a real fluid, composed of a finite number of molecules, be substituted, which will produce unequal pressure, or the component parts of which are tangential to the faces through which they act : this we will call *friction of the fluid*, a designation used from the time of Descartes and Newton down to Venturi.

On introducing into the calculation either this friction or the real molecular state of the fluid, not only will the paradox disappear, and a given impulse or resistance be obtained, but it will be seen to what it is equal. In fact, the equation of relative forces above mentioned being called movements of transmission or flowing motion, *i. e.*, the movements of the centres of gravity of finite fluid elements, the power acquired by the system is quite neutralized, and also the exterior action; but the action of the parts against each other is not neutralized. It will also be found that the impulsive force of the fluid in movement upon the body immersed is equal to the friction caused by its presence in the fluid, both upon that body and also amongst the particles of the fluid. If the equation of the relative active forces be called the individual motions of the molecules, the active force acquired is no longer zero; for there are other motions besides the direct motion, such as transverse undulations, and gyratory motion resulting from the contact of the molecules. It will be found that the impulsion is equal to the half force acquired by these several motions, besides the action of the surrounding molecular particles derived from these motions, which result from the uniform movement of the surrounding fluid.

The two powers of impulsion and resistance are equal. This is proved by attentively considering the close connection which exists between friction in general and the non-translatory movements generated exterior to the body immersed, the continual creation of which movements prevents the active component parts between two layers of fluid from being compensated for in the direction of motion. It will be found, in fact, that the action of their mutual friction is equal to the non-translatory half force generated at the expense of the translatory active force, *plus* the surrounding non-translatory action.

The knowledge thus obtained respecting impulsion may be variously applied :—the principal difficulty in this respect was raised by M. Poncelet. Several experiments have proved, that the particles forced aside by the presence of any body immersed do not spread much out of a fluid prism, the faces of which are at a distance equal to one-half, or to the whole of its greatest breadth. M. Poncelet, arguing from this fact, supposes, in order to arrive at an approximation, that the speeds are all equal in the smallest annular section between the solid body and the faces of the fluid prism, and that there is a constant pressure in both directions; he then determines the difference of these pressures, or the impulsion by superficial unity of the largest transversal section of the body, by assuming an equation of active forces as the movement of the fluid in this space.

This method having been ascertained, there is nothing to prevent a second approximation. For example, instead of a constant upward pressure, a variable pressure may be supposed to exist. Now, whether its gradation be determined by means of the

ordinary hypothesis of the parallelism of fluids, and finding therefrom the integral amount of upward pressure, or whether this pressure be determined in gross, by setting out an equation of quantities of movement and an equation of active forces, as M. Belanger has done, for motion in pipes,—or by setting forth an equation of active forces in relative movements, by regarding the downward pressure as constant, the same result will be obtained.

The most remarkable thing is, that the result is the same as when our principles are applied; that is to say, when the impulsion is estimated by the friction, or by the neutralized active translatory forces, and when the loss, or the extraordinary friction which takes place in violent motion, resulting from the sudden re-enlargement of the sections, is estimated by the known theorem of Borda.

By the experiments of Dubuat (*Principes, No.* 484), and of Beaufoy (*Nautical Experiments*), the extent of impulsion given by ordinary friction may be ascertained with the aid of some little calculation. Thus, by combining their results with what is known of the intensity of the friction of running water in pipes, by the results of other experiments, and by estimating the interior friction according to the law adopted by Newton, Navier, and Poisson; the relations of the speeds of the various parts round the body immersed, may be ascertained, and those coefficients calculated, by which it is necessary (as M. Poncelet remarked, in 1828) to multiply the active forces owing to the mean speeds, in order to ascertain the true active force. Other considerations will permit of the gradual augmentation of the downward pressure being calculated up to a certain point.

From these various data, and by making, as M. Poncelet has done, some plausible hypotheses as to certain quantities, results analogous to those given by experience, relative to various bodies immersed, will be arrived at.

By the same principles a fact well known in seaports, and quite at variance with the old theories, may be explained; which is, that pieces of wood may be more easily drawn out with the large than the small end foremost.

These experiments may therefore prove useful in application, independently of the advantage they possess of shewing the true cause of the facts under consideration, and may serve to explain (by shewing the real and physical state of the question) a singular scientific phenomenon, which had been abandoned without explanation by such geometricians as Euler and D'Alembert.—[*Comptes Rendus.*]

REPORT OF AMERICAN PATENTS.

From the "Journal of the Franklin Institute."

BY MR. C. M. KELLER.

To Christian V. Queen, *of Peeksville, New York, for improvements in the portable forge.*

The forge is provided with shutters, which slide around to enclose the fire-place when not in operation. The forge fan is provided with a pipe which communicates with the bellows, and from this pipe there is a branch provided with a valve, so that air can be admitted to the fire when the bellows are not at work.

The patentee claims the combination of the curved sliding-shutters for enclosing the space over the fire, and the device for admitting a draught of air to keep up the combustion during the intervals in which the bellows are not employed; the same being effected for the purpose and substantially in the manner made known.

To Marmaduke Osborne, *of New York, for an improvement in the manufacture of hat bodies of wool or fur.*

The patentee claims saving the labour of reblocking and of ironing hat bodies, by interposing between them and the block, a material to which resinous stiffening will not adhere, or to which, if it does adhere, will not adhere to the block; by which device, in either case, the body may be allowed to dry upon the block, and may be removed therefrom in perfect form.

To John Plant, *of Washington, for an improvement in the method of curing smoky chimneys.*

The patentee claims first, forming a recess in the breast of a chimney over the arch of the fire-place, for the reception of external air, and delivering the same in a thin stratum, the whole width of the arch; and, secondly, gathering the throat of the flue, by curving out from that side which the flue is to be carried up, and curving the other side up over it.

To James Bogardus, *of New York, for a machine for slitting India-rubber.*

The patentee says:—"Instead of attaching the cutting wheels to the shafts permanently, they are put on by means of a feather so as to turn with the shafts, and yet slide thereon freely; in this way the edges of the two series, where they pass between each other, can be kept in close contact by the turning of a nut on the end of one of the shafts; for the turning of this nut must of necessity act on all the wheels of the two series.

"I am aware that a series of cutters, or discs, have been secured

on a shaft by means of a nut, and therefore I wish to be distinctly understood, that I do not claim this as my invention; but what I claim is, the method of adjusting the cutter edges of two series of cutting wheels, which fit between each other, by having each series to slide endwise on a shaft, so that the edges of the two series can be forced into contact by a nut, wedge, spring, or other analogous device."

To WILLIAM T. SENIOR, *of New York, for an improvement in pianos.*

THE patentee claims the introduction of an arch in the middle of the bottom, whereby great power of resisting the strain caused by the tension of the wire strings of the pianoforte is obtained, besides other advantages in improving the qualities of the instrument by keeping the case always in shape, so that it cannot draw up or "wind," as is invariably the result in the present mode of manufacture, and consequently keeping the instrument in tune and order for a much longer period.

This improvement consists in so arranging the planks and timbers that the interior or middle layer shall form an arch springing from an abutment at each end, on the under side coming together at the middle and joining at the top, thus applying that principle in obtaining increased strength and power of resistance.

To WILLIAM DRIPPS, *of Coatsville, Pennsylvannia, for improvements in water-wheels.*

CLAIM:—"What I claim as my invention, is making the apertures in the wheel, for the introduction of the water to the buckets, to extend through the outer or cylindrical perimeter thereof, near the top, and then spirally down between the buckets to the bottom thereof, in the manner described, in combination with the funnel-shaped inner rim and curved buckets, as set forth, whether the water be introduced from the inside or outside of the wheel, as before stated.

"I also claim the combination of the sliding frame, and segment valves connected therewith, by rods or stems of unequal lengths, for letting on the water by degrees, in the manner set forth."

To R. F. LOPER, *of Philadelphia, for an improvement in the method of letting down and raising propellers.*

THE patentee says:—"My invention consists in attaching two screws to cog-wheels on the deck of the vessel, which mash into a large cog-wheel on the drum of a capstan, the threads of the screws taking into nuts formed in the sliding frame of the propeller, the sides of which frame are bored out cylindrically to a certain depth, to admit the screws to pass therein, and to pro-

tect them from the action of the salt water deposits and rust, which would otherwise prevent their working."

"I claim combining the elevating screws with the frame of the propeller, by means of openings therein to receive the same, so constructed, as entirely to exclude the surrounding water from that part of the screws which is within the frame, the whole being constructed and arranged substantially as herein set forth."

To George Faber, *of Canton, Ohio, for an improved method of indicating the height of water in steam-boilers.*

The patentee says:—"My invention consists simply in attaching a magnet to the axis of motion of a wheel or lever, to which the float is supended or attached, to communicate motion by attraction and repulsion, to an index needle turning on an axis outside the boiler, and separated from the magnet by a steam-tight plate."

He claims the method herein described, or any other substantially the same, of indicating the rise and fall of water in a steam-boiler or generator, by means of an indicator outside thereof, actuated by a magnet connected with a float, or any other body, within the boiler, that rises and falls with the water, and connected with the magnet substantially as herein described.

To R. F. Loper, *of Philadelphia, Pennsylvania, for an improvement in the steam-engine.*

The patentee says:—"The nature of my invention consists in rotating two crank-shafts with equal velocities, and in opposite directions, by means of a connecting-rod, extending from the cross-head of a steam-engine to the two crank-shafts, the centre of vibration of the cross-head being centrally between them."

He claims connecting the cross-head of a reciprocating engine with two crank-shafts on opposite sides of, and at equal distances from, the centre of vibration, by means of a connecting-rod or lever turning on the cross-head, and reciprocating with it, and taking hold of the cranks on the two crank-shafts, by which they are caused to turn in opposite directions, and with equal velocities, as herein described.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1847.

Feb. 26. *John Edward Smith & Co.*, of 11, Wood-street, Cheapside, for a shirt.

26. *James Thomas Woodman*, of Walton-on-Thames, for a portable self-adjusting leg and foot-rest.

26. *John Jones*, of 127, Goswell-street, for a mortice and tenon cutting machine.

Feb. 26. *James Tonkin*, of 315, Oxford-street, for an angle piece for iron bedsteads.

27. *Edward Hill*, of Park-terrace, Liverpool-road, Islington, mariner, for a universal jointed stand, for supporting the blocks or shapes used by milliners.

27. *George Firmin*, of Fordham, Essex, engineer, for a boot-stretcher.

Mar. 2. *John Weiss & Son*, of 62, Strand, surgical instrument makers, for an improved inhaler for the vapours of ether, iodine, &c.

3. *Ahrend Kohne*, of Lawrence Pountney-lane, stay-maker, for a lady's spring dress-improver.

4. *Fenton & Marsdens*, of Sheffield, for an improved brace-head.

4. *Philip le Capelain*, of Chancery-lane, for a re-acting halter, for horses.

5. *M. Salt & Son*, of 21, Bull-street, Birmingham, cutlers, for a portable regulating ether inhaler.

6. *Richard Bright*, of 37, Bruton-street, for an improved lamp glass-holder.

6. *Frederick Allen*, of 15, Spencer-street, Birmingham, for a fastening for shirt studs, buckles, brooches, and buttons.

9. *Samuel Ghrimes*, of 71, Baker-street, Portman-square, dentist, for a concentric cylinder ether and spirit inhaler.

10. *Samuel Fox*, of Stockbridge Works, near Sheffield, for an improved rib for umbrellas and parasols.

10. *George Wilson*, of York, glass-manufacturer, for an ether vapour inhaler.

10. *Alfred Nevill and Charles Richard Hughes*, of 121, Wood-street, City, for a shirt.

11. *Miller & Sons*, of 179, Piccadilly, London, for a lamp.

11. *Robert Forsyth Wade*, of the Congreve War Rocket Manufactory, West Ham and London-street, Fenchurch-street, for the Perlucidas signal-light.

12. *William Woolford*, of Bramley, near Leeds, stuff-presser, for an improved oven for heating plates for finishing or glossing woollen and other fabrics.

13. *Joseph Bothway, R. N.*, of Union-street, Plymouth, for an internal iron-strapped wood block.

Mar. 13. *Smith & Gibbs*, of Wellingboro', Northamptonshire, for the Cambridge Albert shoe.

15. *James Northage Holbrook and David Dyer*, of Stamford-hill, for a fastening for buttons, studs, brooches, &c.

16. *Edward Sparkhall*, of 142, Cheapside, lithographic-printer, for a pocket pantagraph.

16. *W. & T. Avery*, of Birmingham, for apothecaries' weights.

19. *Samuel Woollatt*, of Aston Bury, Herts, for an improvement in horse-hoes.

19. *John Tattersall Cunliffe, James Henry Cunliffe, and William Abbey Burslem*, of 21, Church-street, Manchester, for an improved picker for power looms.

20. *John Blackwell*, of Northampton, for an apparatus for inhaling ether, nitrous oxide, chlorine, steam, naphtha, iodine, and other volatile substances; and for developing, receiving, or conducting gases.

22. *Richard Bright*, of 37, Bruton-street, lamp manufacturer, for a self-regulating lamp-spring.

22. *James Bosnell*, of Goole, machine-maker, and *John Naylor*, of Winterton, Lincolnshire, machine-maker, for a hand-truck or barrow.

22. *Joseph Webb*, of 23, Roman Road, Old Ford, Middlesex, for a safety envelope lace wafer.

23. *Joseph Fenn*, of Newgate-street, tool-maker, for an improved wrench.

23. *D. Cook & Co.*, of Commerce-street, Glasgow, for a cane punt.

23. *William and John Lea*, of Wolverhampton, for a double safety lock.

23. *Messrs. Robinson*, of Commercial-road East, for a shirt.

25. *William Marwick Michell*, of Ufston-road, Kingsland, for the single crutch illuminator.

25. *Henry Fearncombe*, of Wolverhampton, tin-plate worker and japanner, for a shower-bath.

26. *Samuel Beddows and Samuel Twist*, of Birmingham, for an improved bagatelle table.

27. *Hyam Brothers*, of Bristol, Manchester, London, &c., for an over-coat (Balandran).

27. *Peter Gammon*, of Birmingham, for an improved chest of drawers.

27. *Samuel Varley*, of Sheffield, surgeons' instrument maker, for a portable railway fire-escape.

List of Patents

That have passed the Great Seal of IRELAND, from the 20th February to the 20th March, 1847, inclusive.

To Eugene Bazille, of Rouen, in the kingdom of France, manufacturer, for improvements in obtaining heat during the manufacturing of coke, and applying such heat to various purposes,—being a communication. Sealed 27th February.

James Napier, of Shacklewell, in the county of Middlesex, operative chemist, for improvements in smelting ores. Sealed 27th February.

Charles Payne, of Whitehall Wharf, Cannon-row, Westminster, Gent., for improvements in preserving vegetable matters. Sealed 27th February.

Peter Claussen, of Leicester-square, in the county of Middlesex, Esq., for improvements in machinery for weaving. Sealed 20th March.

List of Patents

Granted for SCOTLAND, subsequent to February 22nd, 1847.

To William Eaton, of Camberwell, Surrey, engineer, for improvements in machinery for twisting cotton or other fibrous substances.—Sealed 23rd February.

Alfred Krupp, principal of the house of Frederick Krupp, of Essen, Prussia, but now of Leicester-square, London, for certain improvements in the manufacture of spoons, forks, and other similar wares, and in the machinery or apparatus employed therein; parts of which are also applicable to other manufacturing processes.—Sealed 24th February.

William George Armstrong, of Newcastle-upon-Tyne, for an improved lifting, lowering, and hauling apparatus.—Sealed 25th February.

Charles Barlow, of Chancery-lane, London, for a new apparatus and arrangement of machinery to be used in collecting the contents of sewers, drains, and cesspools, and also treating the mass so collected in such a manner, as to render the same applicable to agricultural and other useful purposes,—being a foreign communication.—Sealed 26th February.

Thomas Hutchison, of Paisley, salesman, for a new machine for constructing patterns in stripes, checks, and tartans, for woven and other fabrics.—Sealed 26th February.

Pierre Armand Le Comte de Fontainemoreau, of 15, New Broad-street, London, for certain improvements in machines for the manufacture of bricks and other plastic products,—being a foreign communication.—Sealed 2nd March.

Andrew Crosse, of Broomfield, Somersetshire, for improvements in treating fermentable and other liquids, so as to cause impurities or matters to be extracted or precipitated.—Sealed 4th March.

François Stanilas Meldon de Sussex, of Millwall, London, manufacturing chemist, for improvements in the manufacture of chlorine, hydrochloric acid, and nitric acid, and obtaining several products therefrom.—Sealed 4th March.

Henry Henson, of Hampstead, London, for a new fabric suitable for goods, wrappers, waggon covers, and other like purposes, and certain processes employed in the manufacture of the same.—Sealed 5th March.

Robert Stirling Newall, of Gateshead, for certain improvements in locomotive engines.—Sealed 5th March.

John Wood, of Leeds, machine maker, for certain improvements in machinery for spinning fibrous substances.—Sealed 8th March.

George Lowe, of Finsbury Circus, London, civil engineer, for improvements in the manufacture of, and in burning gas, and in the manufacture of fuel.—Sealed 9th March.

James Roose, of Darlaston, Staffordshire, tube manufacturer, for improvements in the manufacture of welded iron tubes.—Sealed 9th March.

Charles Richardson, of London, for certain improvements in making and refining sugar, and in the application of the products of the sugar cane to manufacturing purposes; and also in the machinery and apparatus employed therein,—being a foreign communication.—Sealed 10th March.

Albert Robert Cuninghame, of Sydenham, Kent, and Joseph Threlfall Carter, of Sydendam aforesaid, engineer, for certain improvements in propelling carriages on railways.—Sealed 22nd March.

William Newton, of the Office for Patents, 66, Chancery-lane, London, civil engineer, for certain improvements in engines to

be worked by gas vapour, or steam, either separately or in combination,—being a foreign communication.—Sealed 22nd March.

Charles Fox, of No. 3, Trafalgar-square, London, engineer, for improvements in the construction of presses; in shearing, cutting or punching pieces of metal; in welding or uniting pieces of metal together; and in pressing or forming pieces of metal into forms or shapes.—Sealed 22nd March.

New Patents
SEALED IN ENGLAND.
1846-47.

To James Napier, of Shacklewell-lane, operative chemist, for improvements in smelting copper and other ores. Sealed 2nd March—6 months for inrolment.

Charles Stewart Duncan, of Lombard-street, Gent., for improvements in public vehicles. Sealed 2nd March—6 months for for inrolment.

Samuel Hunton Townsend Bishop, of Hackney-terrace, Gent., for improvements in the construction of the upper part of chimneys. Sealed 2nd March—6 months for inrolment.

William Eccles and Henry Brierly, of Walton-le-Dale, in the county of Lancaster, for improved machinery to be used in spinning. Sealed 2nd March—6 months for inrolment.

John Wood, of Leeds, machine-maker, for certain improvements in machinery for spinning fibrous substances. Sealed 2nd March—6 months for inrolment.

Andrew Crosse, of Broomfield, Somersetshire, Esq., for improvements in treating fermentable and other liquids, so as to cause impurities or matters to be extracted or precipitated. Sealed 2nd March—6 months for inrolment.

George Fossick, engine-builder, Thomas Hackworth, engine-builder, and Thomas Elliott, superintendant of locomotives, all of Stockton-on-Tees, in the county of Durham, for certain improvements in locomotive and other boilers. Sealed 3rd March 6 months for inrolment.

Richard Roberts, of Manchester, engineer, for improvements in machinery for punching and for perforating metals. Sealed 5th March—6 months for inrolment.

Richard Roberts, of Manchester, engineer, for improvements in machinery to perform the processes called beetling, mangling, and the like. Sealed 5th March—6 months for inrolment.

Amedee François Remond, of Great Charles-street, Birmingham, for certain improvements in steam-engines,—being a communication. Sealed 9th March—6 months for inrolment.

Robert Jones, of Wardour-street, Soho, hot-presser and finisher, for certain improvements in dressing or finishing goods or fabrics. Sealed 10th March—6 months for inrolment.

Matthew Sproule, of Liverpool, engineer, for certain improvements in steam-engines. Sealed 10th March—6 months for inrolment.

James Stevens, of Darlington Works, Southwark Bridge Road, engineer, for improvements in apparatus for conveying signals or communications between distant places, parts of which are also applicable to lamps and burners. Sealed 10th March—6 months for inrolment.

John Isaac Hawkins, late of Liverpool-street, King's-cross, but now of Charles-square, Hoxton, civil engineer, for certain improvements in holding together or filing letters, music sheets, newspapers, and other documents. Sealed 10th March—6 months for inrolment.

Edward Johnson Coale Atterbury, of Leeds, merchant, for certain improvements in gearing machinery,—being a communication. Sealed 10th March—6 months for inrolment.

William Newton, of the Office for Patents, 66, Chancery-lane, civil-engineer, for certain improvements in engines, to be worked by gas vapour or steam, either separately or in combination,—being a communication. Sealed 10th March—6 months for inrolment.

James Murdoch, of Staple-inn, for an improved mode of preparing and employing certain colors and materials for painting,—being a communication. Sealed 10th March—6 months for inrolment.

Kasimir Vogel, of Saint Paul's Church Yard, London, manufacturer, for a new manufacture of weavers' harness, and for machinery for the production of the same. Sealed 10th March—6 months for inrolment.

Thomas Waterhouse, of Edgeley, Cheshire, cotton manufacturer, for certain mechanical improvements, applicable to railway engines and tenders, and to railway carriages of various kinds. Sealed 10th March—2 months for inrolment.

Henry Fletcher, of Over Darwen, Lancashire, manufacturer, for improvements in apparatus for ascertaining the distance which locomotive engines and carriages have travelled upon railways. Sealed 10th March—6 months for inrolment.

Louis Nicolas de Meckenheim, of Birmingham, machinist, for a certain improvement or certain improvements in machines to be used in the manufacture of nails, screw-blanks, rivets, bolts, and pins. Sealed 10th March—6 months for inrolment.

Sampson Lloyd, of Old Park Iron Works, Wednesbury, Staffordshire, engineer, for improvements in the manufacture of tires or hoops for wheels, and other articles to be made of iron or steel. Sealed 15th March—6 months for inrolment.

Charles Fox, of Trafalgar-square, city of Westminster, engineer, for improvements in the construction of presses. Sealed 15th March—6 months for inrolment.

Jean Joseph Hazard Petit, of King's-road, Chelsea, chemist, for improvements in the manufacture of oils, and in apparatus for disinfecting and purifying oils and other inflammable or spirituous matters; and improvements in lamps and gas-burners. Sealed 16th March—6 months for inrolment.

Charles Tennant Dunlop, of Glasgow, manufacturer, for improvements in the manufacture of alkali and chlorine, and in application of the products resulting therefrom. Sealed 16th March—6 months for inrolment.

William Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for certain improvements in engines to be worked by gas vapour or steam, either separately or in combination,—to extend to the colonies only,—being a communication. Sealed 16th March—6 months for inrolment.

Joseph Henry Tuck, of Paris, in the kingdom of France, Gent., for improvements in apparatus for ventilating buildings, carriages, chimneys, and other places where a change of air is required. Sealed 16th March—6 months for inrolment.

Robert Scotthorn, of Somers-town, engineer, for improvements in engines for obtaining and applying motive power. Sealed 17th March—6 months for inrolment.

James Wills Wayte, of Leeds, printer, for certain improvements in self-feeding furnaces, adapted both for land and marine purposes, for the better prevention of smoke arising from fires used in such furnaces. Sealed 18th March—6 months for inrolment.

Peter Britus Coxon, of Lenton, in the county of Nottingham, machinist, for a new method of embossing, raising, and forming ornamental figures and designs on certain intertwined textile fabrics. Sealed 19th March—6 months for inrolment.

John Leslie, of Conduit-street, Hanover-square, one of the tailors to Her Majesty's Household, for improvements in the combustion of gas for the purposes of light. Sealed 22nd March —6 months for inrolment.

Charles Fox, of Trafalgar-square, Charing-cross, engineer, for improvements in the permanent way of railways, and in carriages to be employed on railways,—being a communication. Sealed 23rd March—6 months for inrolment,

Morris Lyons, of Birmingham, chemist, and William Millward, of the same place, silver operator, for certain improved alloys of metals, and improvements in the deposition of metals. Sealed 23rd March—6 months for inrolment.

George Fergusson Wilson, of Belmont, Vauxhall, Surrey, Gent., for improvements in the production of light, and in the manufacture or preparation of materials applicable thereto. Sealed 23rd March—6 months for inrolment.

William Henry Hatcher, of the Strand, civil engineer, for improvements in electric telegraphs, and in apparatus connected therewith, and also in electric clocks and time-keepers. Sealed 23rd March—6 months for inrolment.

François Stanilas Meldon de Sussex, of Millwall, manufacturing chemist, for improvements in smelting copper and other ores. Sealed 23rd March—6 months for inrolment.

William Henry Kempton, of South-street, Pentonville, gent., for improvements in copying-presses. Sealed 23rd March—6 months for inrolment.

William Bullock Tibbits, of Braunston, Southampton, gent., for certain improvements in obtaining and applying motive power. Sealed 23rd March—6 months for inrolment.

Henry Smith, of the firm of H. Smith & Co., of Stamford, agricultural implement makers, for certain improvements in machinery for cutting and separating vegetable substances; also improvements in the construction of machines for dibbling and sowing seed, and distributing vegetable substances and manure over land; part of which improvements is applicable to wheel carriages in general. Sealed 23rd March—6 months for inrolment.

Henry Heycock, of Manchester, Lancashire, merchant, for certain improvements in rotary engines, to be worked by steam or other power, which said improvements are also applicable to raising or forcing fluids. Sealed 23rd March—6 months for inrolment.

William Bruce, of Essex-court, Temple, and of Flimstow, near Pembroke, barrister at law, for improvements in constructing piers, breakwaters, and other submarine works of stone. Sealed 25th March—6 months for inrolment.

Charles May, of Ipswich, Suffolk, civil engineer, for improvements in railway chairs, the fastenings to be used therewith, and in trenails. Sealed 27th March—6 months for inrolment.

John Henry Griesbach, of Carlton Villas, Maida Vale, for improvements in the construction of railways, and in engines and carriages to run thereon. Sealed 29th March—6 months for inrolment.

Alexander Morton, of Morton-place, Kilmarnoch, for improvements in printing warps. Sealed 29th March—6 months for inrolment.

John Fisher, the younger, of Radford Works, Nottingham, mechanician, for improvements in the manufacture of lace or weavings. Sealed 29th March—6 months for inrolment.

Samuel Hardacre, of Manchester, machinist, for certain improvements in machinery or apparatus for opening and for carding cotton and other fibrous substances, and for grinding the cards of carding engines,—being partly a communication. Sealed 29th March—6 months for inrolment.

George Robert Skene, of Bedford, Esq., Fellow of the Royal Medical and Chirurgical Society, for improvements in making and refining infusions and decoctions. Sealed 31st March—6 months for inrolment.

Samuel Millbourn, of St. Mary's Cray, in the county of Kent, paper maker, for improvements in the manufacture of paper. Dated 3rd October, 1846—6 months for inrolment.

Henry Woodfull, of Foots Cray, in the county of Kent, paper-maker, for certain improvements in paper-making machinery. Dated 3rd October, 1846—6 months for inrolment.

[The two last Patents being opposed at the Great Seal, were not sealed till the 31st March, but are dated 3rd October, by order of the Lord Chancellor.]

CELESTIAL PHENOMENA for April, 1847.

D.	H.	M.	
1			Clock before the ☉ 4m. 4s.
			☽ rises 7h. 26m. A.
			☽ passes mer. 0h. 8h. M.
			☽ sets 4h. 45m. M.
	—		Occul. *h* Virginis, im. 8h. 55m. em. 9h. 20m.
2	7	41	♀ in the ascending node
3	4	27	Vesta in oppo. to the ☉, intens. of light 1·323
4	3	19	♅ in conj. with the ☉
5			Vesta greatest hel. lat. N.
5			Clock before the sun, 2m. 52s.
—			☽ rises 11h. 34m. A.
—			☽ passes mer. 3h. 13m. M.
—			☽ sets 7h. 14m. M.
	9	53	♃'s first sat. will em.
6	7	39	♃'s second sat. will em.
6	20		♀ in conj. with Pallas, diff. of dec. 22. 23. N.
8	3	26	☽ in □ or last quarter
9	23	37	♂ in conj. with the ☽ diff. of dec. 6. 18. S.
10			Clock before the sun, 1m. 26s.
—			☽ rises 2h. 40m. M.
—			☽ passes mer. 7h. 39m. M.
—			☽ sets 0h. 44m. A.
11	2	56	Juno in □ with the ☉
11	13	8	☿ in the descending node
	20	4	♄ in conj. with the ☽ diff. of dec. 5. 13. S.
12	17	42	☿ stationary
13	9	30	☿ in conj. with the ☽ diff. of dec. 1. 58. S.
	10	15	♃'s second sat. will em.
	11		☽ in Perigee
14	3	10	♅ in conj. with the ☽ diff. of dec. 1. 3. S.
	—		☉ eclipsed, invis. at Greenwich
15			Mercury R. A. 0h. 13m. dec. 0. 35. N.
	—		Venus R. A. 3h. 24m. dec. 19. 16. N.
	—		Mars R. A. 21h. 14m. dec. 17. 24. S.
	—		Vesta R. A. 12h. 58m. dec 7. 36. N.
15	—		Juno R. A. 19h. 25m. dec. 8. 6. S.
	—		Pallas R. A. 2h. 59m. dec. 5. 19. S.
	—		Ceres R. A. 4h. 47m. dec. 23. 49. N.
	—		Jupiter R. A. 4h. 52m. dec. 22. 13. N.
	—		Saturn R. A. 22h. 45m. dec. 9. 34. S.
	—		Georg. R. A. 0h. 55m. dec. 5 16. N.
	—		Mercury passes mer. 22h. 38m.
	—		Venus passes mer. 1h. 52m.
	—		Mars passes mer. 19h. 41m.
	—		Jupiter passes mer. 3h. 20m.
	—		Saturn passes mer. 21h. 10m.
	—		Georg. passes mer. 23. 19.
	—		Clock before the sun, 0m. 7s.
	—		☽ rises 5h. 16m. M.
	—		☽ passes mer. 0h. 14m. A.
	—		☽ sets 7h. 23m. A.
15	6	22	Ecliptic conj. or ● new moon
16	20		♀ in conj with the ☽ diff. of dec. 3. 56. N.
18	6		♃ in conj. with the ☽ diff. of dec. 4. 36. N.
20			Clock after the sun 1m. 3s.
	—		☽ rises 9h. 1m. M.
	—		☽ passes mer. 4h. 52m. A.
	—		☽ sets Morn.
21	8	14	♃'s first sat. will em.
21	10	39	Ceres in conj. with ♃
	16	51	☿ in Aphelion
22			Occul. *A*2 Cancri, im. 11h. 24m. em. 12h. 16m.
22	9	9	☽ in □ or first quarter
25			Clock after the sun 2m. 4s.
	—		☽ rises 2h. 8m. A.
	—		☽ passes mer. 8h. 41m. A.
	—		☽ sets 2h. 40m. M.
	—		Occul. *p*2 Leonis, im. 12h. 30m.
	18		☽ in Apogee
28	5	19	☿ greatest elong.
29			Occul. λ Virginis, im. 16h. 16m. em. 17h. 12m.
30	1	26	Ecliptic oppo. or ○ full moon.

J. LEWTHWAITE, Rotherhithe.

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RECENT PATENTS.

To William Mac Lardy, *of Salford, in the county of Lancaster, manager, for certain improvements in machinery or apparatus applicable to the preparation and spinning of cotton, wool, silk, flax, and other fibrous substances.*—[Sealed 22nd December, 1845.]

This invention consists, firstly, in the application of a novel arrangement of mechanism to the well-known preparation machines called "the slubbing and roving or jack frames;" the object of which improved apparatus is to produce the variable speed required for winding on the slubbings or rovings, according to the increasing diameter of the bobbins used in such machines, whilst the bobbins are being filled. The variable speed is obtained by employing a spirally-grooved cone, with a drum or cylinder upon a shaft, for coiling or uncoiling a chain, band, or strap, or any other suitable material; or this improved variable speed may be obtained by coiling or uncoiling the chain, band, or strap from either a spirally-grooved or plain cone, or from one cone upon another, or by the application of spur-teeth,

cut or formed spirally around the cone, from one end to the other. Secondly, the invention consists in the application of two of the "differential boxes," or "equational mechanism" (commonly called "Houldsworth's jack-in-the-box"), instead of one, as usually employed in such machines, either in connection with the apparatus above described, or with the mechanism usually employed for producing such variable speed with a single differential box; the object of introducing such additional differential box being for the purpose of producing such variable speed in a much more steady and certain manner. Thirdly, the invention refers to those machines used in spinning cotton, &c., called or known by the name of "mules," and particularly to that part of such machines called the "shaper or shaping-plate," as described in the specification of a patent granted to Mr. James Smith, and commonly known to spinners as "Smith's self-acting mule;" the top part of which shaper is to be worked by a cam or excentric, for the purpose of crossing the yarn on the cop, and binding it more compactly together, whereby it is rendered less liable to injury in carriage.

In Plate XI., fig. 1, represents, in back view, a part of an ordinary roving or slubbing-frame, with the improvements attached thereto; and fig. 2, is a transverse section of the same. *a, a,* is the frame-work of the apparatus; *b, b,* is the main driving-pulley; *c, c,* is the driving-shaft; *d, d,* is the creel, carrying the bobbins *e, e, e*; *f, f, f,* are the drawing-rollers; *g, g,* is a conical pulley, having a spiral groove on its surface; and *h, h,* is a long cylindrical drum, placed loosely upon the horizontal shaft *i, i,* and caused to revolve thereon, but at a diminished speed, by means of a worm and wheel *k, k,* the bevil-wheels *l, l,* and the spur-gearing *m, m.* *n, n,* is a chain, fastened at one end to the pulley *g, g,* and coiled in the spiral groove the whole length of the conical pulley; its other end is fixed to the cylindrical drum *h, h*; thus it will be evident, that as the cylindrical drum *h, h,* revolves, it will, by uncoiling the chain *n, n,* from the conical pulley *g, g,* cause that pulley to revolve at a speed diminishing in a corresponding ratio with its increasing diameter; and thus, by the spur-wheel *g**, (which is fast on the shaft with the conical

pulley) working into the spur-wheel *o*, which drives the pinion *p*, on the one end of the shaft *q*, motion is communicated to the bevil-wheel *q**, on the other end of the shaft *q*, which, by means of a small upright shaft and other apparatus usually employed for raising and lowering the copping-rail, gives the requisite gradual diminution of speed to that rail.

If only one differential box is employed, the variable motion is communicated to the bobbins in the following manner:—Supposing the chain *n*, to be uncoiling from the smallest diameter of the conical pulley *g*, and the bevil-wheel *r*, which is fast upon the driving-shaft *c*, to be making three hundred revolutions per minute, while the centre wheel *s*, of the differential-box is making twenty revolutions in the same direction by the wheel *v*, on the shaft *w*, connected by gearing to the spur-wheel *g**, on the shaft of the conical pulley, then the loose bevil-wheel *t*, connected to the spur-wheels *u*, *u*, which communicate motion to the bobbin-shaft, would make two hundred and sixty revolutions per minute; but, by the time that the chain *n*, in uncoiling, has reached the largest diameter of the conical pulley, the speed of the centre-wheel *s*, will have been gradually reduced to five revolutions per minute (if the diameter of the full bobbin is taken at four times that of the empty one), and the loose bevil-wheel *t*, will make two hundred and ninety revolutions, and consequently communicate a corresponding increase of speed to the bobbins; but if the diameter of the full bobbin is more or less than four times that of the empty one, the speed of the centre-wheel *s*, will have to be changed in a corresponding proportion. When the additional differential-box is used, the spur-wheel *v*, upon the shaft *w*, (which in the above case drives the centre-wheel *s*, of the first differential-box,) is removed, and the motion communicated as shewn by dotted lines. A worm *x*, on the shaft *i*, communicates motion, by means of a small upright shaft *y*, to the bevil-wheel *z*, fixed on the boss of the bevil-wheel 1, of the second differential-box, and thus to the spur-wheel 2, fixed to the boss of the bevil-wheel 3, (the whole of the differential-box being loose upon the shaft *c*,). The spur-wheel 2, drives the wheel 4, on one end of a tube 5, through which the shaft *i*, passes; at the other end of the tube 5,

the spur-pinion 6, is fixed, which drives the centre-wheel *s*, of the first differential-box. Now, supposing the diameters of the wheels to be so regulated that the centre-wheel 8, of the first differential-box shall make five revolutions per minute in the same direction as the bevil-wheel *r*, (providing that the centre-wheel 8, of the second differential-box were stationary); and supposing also the centre-wheel 8, to be driven by means of the spur-wheel 9, fixed on the shaft *w*, seven-and-a-half revolutions in the contrary direction to the bevil-wheel 1, then the centre-wheel *s*, of the first differential-box will make twenty revolutions: thus the chain *n*, and conical pulley *g*, will only have to drive the centre-wheel 8, of the second differential-box seven-and-a-half revolutions per minute, at the starting of the machine, instead of driving the wheel *s*, twenty revolutions (as is the case when only one differential-box is employed); and the work which the cone and chain have to perform is gradually reduced as the chain *n*, approaches the largest diameter of the conical pulley *g*.

Another modification of the same invention may be made by reversing the positions of the conical pulley *g*, and the cylindrical drum *h*, by coiling the chain *n*, around the drum, and taking it up with the conical pulley. The speed of the drum *h*, will then increase instead of decrease, as in the preceding case, and consequently the speed of the shaft *w*, will increase also. The diameters of the gearing must be so arranged that the centre-wheel *s*, shall make twenty revolutions per minute at starting, and the centre-wheel 8, of the second differential-box shall just commence moving in the same direction as the bevil-wheel 1; and thus, as the chain *n*, coils on to the larger diameter of the conical pulley *g*, the speed of the centre-wheel 8, will increase, and the speed of the centre-wheel *s*, will decrease in a corresponding ratio, until its speed is reduced to five revolutions per minute, as above described; in which case, the shaft *q*, will have to be driven from the centre-wheel *s*. It will be understood, that the above-mentioned speeds are given for the sake of illustration merely; as, by altering the diameters of the gearing, the relative speeds of the wheels 8, and *s*, may be varied, although the ultimate result will be the same;—and, further, it may be ob-

served that, in the above-mentioned cases, the spindles are supposed to revolve quicker than the bobbin; but when the bobbin is made to revolve quicker than the spindle, the motion of the centre-wheel *s*, must be reversed. Fig. 3, shews a side view of a cone, having a spiral coil of teeth, extending from end to end of the same, in which a pinion may be caused to work, instead of having a grooved pulley and chain.

Fig. 4, is a sectional view of the shaper, as used in Smith's self-acting mule, shewing the improvement as attached thereto. The shaper *a*, instead of having its fulcrum at *b*, (as is usually the case) is jointed to the lever *c*, by the pin *d*. *e*, is a ratchet-wheel, upon a small tube, turning loosely upon the stud *f*, on which the excentric *g*, is fixed. This ratchet-wheel *e*, is caused to take up one tooth every "stretch" or traverse of the carriage; and thus, after every certain number of "stretches" (according to the number of the teeth in the ratchet-wheel *e*,), the excentric *g*, will raise the shaper into the position shewn by dots, whereby the crossing of the yarn over the cone of the cop will be effected; thus binding the cop more firmly together, and consequently rendering it less liable to injury in carriage.—[*Inrolled in the Petty Bag Office, June*, 1846.]

Specification drawn by Messrs. Newton and Son.

To GEORGE LODGE, *of Leeds, in the county of York, engineer, for certain improvements in heating water, generating steam, and saving fuel.*—[Sealed 10th August, 1846.]

THIS invention consists in an improved arrangement of apparatus, whereby the heating of water may be economically effected (an increased heating surface being exposed to the action of the flame and heated gases), and a large supply of steam may be quickly generated. The apparatus employed for this purpose is shewn in Plate XIII., as applied to a furnace in conjunction with an ordinary waggon-shaped boiler. It consists of two rectangular vessels or chambers of iron, set parallel to each other, one on either side of the fire-place, and connected together in front by a hollow arch, made also of iron. These vessels or chambers are intended to receive

the water from the force-pump, and, by means of pipes, with which they are provided, to conduct the water over a considerable heating surface before it enters the waggon-shaped boiler. Fig. 1, is a sectional elevation of a furnace, fitted according to the invention, the front end plates of the chambers before mentioned being removed; and fig. 2, is a sectional plan of the improved generating apparatus, taken in the line 1, 2, of fig. 1. a, a^1, are the two rectangular chambers, through which the water passes on its way to the boiler. It is obvious that these chambers may be of a cylindrical or other required form, but the construction shewn in the drawing is preferred, as an extensive heating surface is thereby presented to the fire. b, is the hollow arch, connecting the two chambers together, and forming a passage for the water from one chamber to the other; c, is the boiler, resting on the chambers a, a^1, and connected to the chamber a, by a pipe d; e, is a pipe leading from the supply-pump to the chamber a^1; and f, is a pipe within the chamber a^1, and forming a continuation to the pipe e, for the purpose of conducting the water, as it is supplied by the force-pump, to the opposite end of the chamber at which it enters, as shewn by the arrows in fig. 2. The other chamber a, is similarly provided with a pipe g, forming a continuation of the pipe d, and having an open end near the back end of that chamber. By this arrangement it will be understood that the water, as it enters at the pipe e, will flow along the pipe f, to the back end of the chamber a^1; it will then return to the front, and, by the continued action of the pump, be made to rise up the hollow arch b, and pass into the chamber a. When it has traversed the length of that chamber, it will enter the pipe g, and, passing forward, will rise up the pipe d, and flow into the boiler in a heated state.

On referring to the elevation, fig. 1, it will be seen that the boiler is fixed so that the play of the flame around it will be precisely the same as in the ordinary mode of setting such boilers; the heat is therefore as economically employed with regard to its action on the water in the boiler as heretofore. The chambers a, a^1, (which occupy the place hitherto filled with solid brick-work for supporting the boiler) will therefore,

in exposing the water on its passage to the boiler to the action of the fire, cause it to take up a considerable portion of heat that might otherwise be lost; and as the water is thus submitted to the fire in a comparatively small body, it will become quickly heated, and, entering the boiler in that state, will speedily be converted into steam.

The patentee claims the improved arrangement, above described, for raising the temperature of water on its passage to the boiler, whereby steam may be more quickly generated than by conveying the water directly from the well or supply-cistern to the boiler, and also an economy of fuel will result. —[*Inrolled in the Petty Bag Office, February,* 1847.]

Specification drawn by Messrs. Newton and Son

To James Henry Dickson, *Esq., Captain on half-pay, of Cheltenham, in the county of Gloucester, for certain improvements in saddles.*—[Sealed 23rd July, 1846.]

This invention consists in the application to saddles of an arrangement of springs and frames, termed by the patentee a "lever-bar," to which the girth or girths are to be fastened: this apparatus is said to afford great relief to the horse when making any great exertion, such as leaping, or coughing, and when he is distressed, it enables him to regain his wind immediately.

In Plate XIII., fig. 1, is a front view of a lever-bar, and fig. 2, is a back view, with the back-plate removed. *a*, is the outer frame of the apparatus, furnished with two lugs *b, b,* to receive a pin *c,* which also passes through a loop at the lower end of a strap *d,* and thus secures the apparatus to the strap, which is suspended from the upper part of the framework of the saddle. *e,* is an inner frame, capable of moving up and down within the frame *a;* it has two small rollers *f, f,* that work against the back-plate a^1, of the frame *a,* to reduce the friction; and it is furnished with three buttons *g, g, g,* to which the girth-straps *h, h, h,* are to be attached. a^2, is a plate, forming part of the frame *a,* and fixed at right angles to the front of the same; the ends of this plate do not touch the sides of the frame *a,* but leave a space of sufficient width

to allow the sides of the frame *e*, to work freely. *i*, *j*, are two strong curved steel springs, which are kept in the desired position by a pin *k*, inserted through them; the ends of the spring *i*, abut against the top part of the frame *e*, and the ends of the spring *j*, against the plate a^2. From this description, it will be evident that when a greater degree of force than usual is applied to the straps *h*, by the horse making any great exertion, the springs *i*, *j*, will yield to the required extent; but the strength and elasticity of the springs must be such, that while they allow the horse's body to expand, they will keep the girth close and tight against it, so as to sustain the saddle in its proper position.

The above apparatus is for a gentleman's saddle; one being applied on either side. For a lady's saddle, one apparatus only is used, and it is made somewhat longer than that above described, so as to contain four springs instead of two. The patentee reserves to himself the right to use either kind of lever-bar, and to place one on the right side, or one on the left side of the saddle, or one on each side.

The patentee claims the arrangement of two or more steel-springs fixed inside sliding-frames, which he terms lever-bars, which frames are fixed to or against the saddle-pad or pads, and the girth is fastened thereto, whereby uniform pressure will be given, and the girth will accommodate itself to the muscular motions of the horse. He also claims the fixing and applying one or more of the arrangements of springs and sliding-frames, above described, either to gentlemen's or ladies' saddles, as the case may be.—[*Inrolled in the Inrolment Office, January,* 1847.]

To JOHN WALKER, *of Manchester, in the county of Lancaster, silk manufacturer, for certain improvements in weaving or manufacturing piled or napped cloths or fabrics; and also improvements in machinery or apparatus for cutting the pile or nap of the same.*—[Sealed 20th January, 1846.]

THESE improvements in weaving piled or napped cloths or fabrics apply principally to the manufacturing of plain or

fancy velvets, having silk pile or nap, whether intended for vestings or other purposes; and they consist in certain methods, hereinafter described, of causing the pile-threads in the weaving of such fabrics to float over a certain number of weft-shoots, and then to bind in or interweave with the weft at certain determinable intervals, for the purpose of forming a close and firm back, in order to prevent the pile or nap from becoming loose when being cut. Before proceeding to describe the method of carrying the invention into practical effect, the patentee has thought it necessary to detail the ordinary way of weaving and cutting the pile of such fabrics, which operation is effected as follows:—Two or more distinct sets of warp-threads are introduced into the loom, the upper one being that which will ultimately constitute the pile or nap. Three shoots of weft are first woven, interlacing with both warps, and then a wire (having a groove in its upper surface) is introduced between the warps, causing the upper warp to form loops across the whole width of the fabric; three similar shoots of weft then follow, and another wire is introduced; a third wire is introduced after the weaving of three more shoots of weft. The cutting-knife, or "travat," is then passed along the groove in the wire first introduced, severing in its progress all the loops of the pile-warp. The wire first introduced, being now disengaged from the warp-threads, is again introduced, and three more shoots of weft are woven as before; the second wire is then disengaged, and in like manner the third wire, thus forming the nap or pile of the fabric; the weaver using but three wires in the manufacture of an entire piece.

In the improved method of forming the pile or nap, the wires are dispensed with, and the pile-threads, instead of being cut during the operation of weaving, are cut after the cloth is removed from the loom; by which means the patentee states that he is enabled to weave and finish a piece of velvet in about one-half the time which it would occupy by the previously known method.

Into the loom in which the cloth is to be woven there are introduced, in the usual way, two warps, one of which is

made to form the ground or back, and the other the pile or nap. The warp-threads are so introduced through the loops of the healds or leaves that the whole of either warp, or certain determinable portions of either warp, may be raised or depressed separately. The manner in which the warp-threads are raised or depressed, and also the manner in which the weft-threads are interlaced with them, so as to produce suitable cloth, will be readily understood by referring to the diagrams, figs. 1, 2, and 3, in Plate XII. These diagrams illustrate three methods of weaving, each division representing a single thread (as will be readily understood by the practical weaver); those divisions marked *a, a, a,* and shaded with cross lines, being the pile or nap-threads; those marked *b, b, b, b,* and distinguished with a lighter tint, the ground or back-warp-threads; and those marked *c, c, c, c,* and left white, being the weft-threads.

It will be seen in fig. 1, that for every two pile-threads there is one ground or back-warp-thread; that the threads of the ground or back-warp make, with the threads of weft, what is known by the name of plain or "tabby cloth;" and that each of the threads of the pile or nap-warp, floats over nine shoots of weft successively; and in the succeeding three shoots of weft, it is in the first depressed, in the second raised, and in the third again depressed—that is to say, the pile-threads, after floating over nine shoots of weft successively, interlace with each of the succeeding three shoots. The three shoots of weft, now referred to, serve to keep the pile or nap-threads in firm connection with the body or substance of the cloth.

It will also be observed, that the first, second, and third pile-threads correspond respectively with the fourth, fifth, and sixth, also with the seventh, eighth, and ninth, &c., across the entire width of the cloth; the first pile-thread commencing the float over nine successive shoots of weft, with the first shoot, the second pile-thread with the fifth shoot, and the third pile-thread with the ninth shoot. The first, fourth, seventh, tenth, &c., pile-threads, therefore, float over and interweave similarly with the same shoots of weft;

in like manner, there is a corresponding floating over and interweaving of the second, fifth, eighth, eleventh, &c., and also of the third, sixth, ninth, twelfth, &c., pile-threads.

As shewn in fig. 1, the first twelve shoots of weft, in their interlacings with the threads of both warps, correspond respectively with the second twelve shoots, also with the third twelve shoots, &c.; that is to say, the pattern extends and is confined to twelve shoots of weft.

In the process of cutting the pile-threads (which will be hereinafter more particularly explained) the knife is made to pass in and through the centre of each float of pile-threads, across the entire width of the cloth. It is obvious, therefore, that the length of the pile or nap-threads when cut, and the number of "races" or cuttings in any given length of cloth, woven as above described, is proportionate to the number of weft-shoots there are in that length. The more shoots there are in any given space, the shorter will be the pile or nap-threads, and the more cuttings there will be. When it is required to increase both the length of the pile or nap, and the number of cuttings or "races," per inch, this can be effected (see fig. 2) by making the first four pile-threads correspond respectively with the second four pile-threads, and so on with each succeeding four pile-threads in the warp; and in causing the pile-threads to float over, say thirteen instead of nine shoots of weft. If it be required still further to increase the number of "races" or cuttings, per inch, and at the same time the length of the pile or nap-threads, the first five pile-threads (as in fig. 3,) must be made to correspond with the second five pile-threads, &c., and each pile-thread must be made to float over, say seventeen weft shoots. In this manner, the length of nap, and the number of "races" or cuttings of pile or nap in any given length, may be increased or diminished conjointly or separately. If, for example, the nap of a piece of velvet, woven as represented in fig. 1, be too short, and the "races" or cuttings be of the number required, then, by altering the float of the pile-threads to that represented by fig. 2, or fig. 3, but retaining the same number of weft-shoots, a longer nap will be obtained; the number of "races" or cuttings remaining unal-

tered. On the other hand, if the length of nap in cloth, woven as represented by fig. 1, be that which is desired, but if it be requisite to increase the number of "races" or cuttings, per inch, the same can be effected by altering the float of the pile-threads to that represented in fig. 2, or fig. 3, and by regulating the number of weft-shoots accordingly.

It will be seen, by referring to the diagrams, that four weft-shoots intervene between the commencement of the floats of adjoining pile-threads,—the float of the one commencing, say, on the first shoot, and of the other, on the fifth. It is not necessary, however, that such should be the case, for any number of shoots, from one to a much higher number, may be introduced; the limits to the number being determined only, as in ordinary cloth, by the strength and thickness of the warp-materials used, the strength and thickness of the weft, the weight of the lathe, and the force with which it is wielded, and other similar conditions. Whichever way the cloth be woven, whether with two or any higher number of weft-shoots intervening between the commencement of the floats of adjoining pile-threads, the length of nap-threads, and the number of "races" or cuttings in any given length of cloth, can be regulated in a similar manner to that already described; the methods shewn in figs. 1, and 2, being those preferred as most applicable to the manufacture of silk velvet for vests, shawls, or other articles of a like description.

As previously explained, the threads of the ground or back, in each of the modes of weaving represented in figs. 1, 2, and 3, make, with the shoots of weft, plain or "tabby cloth." Any other than a plain ground or back, however, may be used, provided it be such as will firmly and sufficiently retain in their proper place, the pile or nap-threads; a close and firm back being required in order to prevent the pile or nap from being forced out of its proper position in the process of cutting. Again, if the pile-threads be made from the shoot or weft-threads, and not from the warp-threads, the cutting must be longitudinal, and the floating and binding will be the same as previously described; except that the floating over and interweaving must be with the back warp-threads, and not with

the shoot or weft-threads. In such case, a machine similar to that used in the well known process of cutting fustians, &c. must be adopted.

The improvements in cutting the pile or nap consist, firstly,—in cutting the pile transversely from selvage to selvage, after the velvet or cloth has been removed from the loom, instead of its being cut during the operation of weaving, as heretofore; and, secondly,—in a certain novel arrangement of machinery or apparatus for distending the cloth uniformly during the operation of cutting or forming the nap.

After a piece of cloth (the length of which is immaterial) has been woven in the manner above described, it is taken out of the loom, and introduced, with the pile-floats uppermost, into a frame or machine constructed for the purpose of tightening the cloth uniformly, and disposing of the floats of the pile-threads in such a manner as to make them lie parallel to each other. A long narrow knife with a moveable metal shield or guide at the point (similar to that used in cutting the pile or nap-threads of velveteens, fustians, &c.) is then introduced within the spaces over which the pile-threads float, and passed across the whole width of the cloth; whereby all the pile-threads are severed, and the pile or nap of the cloth is formed.

Fig. 4, represents a plan view, and fig. 5, a side elevation of an arrangement of machinery or apparatus constructed for the purpose of uniformly distending the cloth, whilst the pile or nap is cut. *a, a,* is the main frame-work of the apparatus, and *b,* is a roller or beam, upon which the cloth is wound, with the pile-floats uppermost. *c, c,* are two tension-rails furnished with tenter-pins *d, d, d,* inclined downwards. These tension-rails *c, c,* are connected to the rails *e*, e^1, by links *f, f,* (passing through the rails *e*, e^1), in the ends of which excentrics *g, g,* are fixed.

The rails *e*, e^1, are provided at each end with sockets *h, h,* sliding upon the rods *i, i,* attached to the framing. The rail *e,* when adjusted, is held in the required position by the clicks *k, k,* at each end, taking into the racks *b, b*; and the rail e^1, may be moved by the cords *m, m,* passing around the rollers or barrels *n, n,* which are provided with ratchet-wheels and

clicks *o, o.* *p, p,* is a roller partially covered with wire cards, over which the velvet or other piled fabric passes after the pile or nap has been cut.

When the pile or nap of a piece of velvet or other fabric is to be cut, the selvages of the same are carefully and evenly hooked upon the tenter-pins *d, d*; the excentrics *g, g,* are then turned inwards by the handles *r, r,* which, by means of the links *f, f,* will bring the tension-rails *c, c,* into close contact with the rails e, e^1; thus holding the selvages of the fabric firmly and evenly between the edges of the two rails. Pins are then placed in the holes of the barrels or rollers *n, n,* and the fabric tightened transversely to the required tension; the ratchet-wheels and clicks *o, o,* holding the rail e^1, in the requisite position until released. The fabric is then distended longitudinally, by turning the rollers *b,* and *p,* outwards; the cards on the latter roller taking hold of the back of the cloth without injuring the pile or nap, and the rachet-wheels and clicks *s, s,* holding the rollers in the required position. While thus distended, a length of about twelve inches of the fabric is damped at a time with a sponge, and the pile-threads are severed transversely with a knife or cutting instrument, as above described, until the pile or nap of the whole length of the velvet distended in the frame has been cut. The clicks from all the rachet-wheels are then released, and the excentrics *g, g,* turned outwards, allowing the springs *t, t,* to exert their force and separate the rails *c, c,* and e, e^1. The length of cloth, of which the pile or nap has been cut, is then passed forward, and wound loosely upon the roller *u,* when a fresh length may be similarly distended and operated on as before.

The patentee claims, Firstly,—the peculiar method of weaving, which consists in causing the pile-threads to float over any number of weft-shoots, or ground or back warp-threads, exceeding three in number, and then to interweave with three or more weft-shoots, or ground or back warp-threads; and also in the intervention of two or more weft-shoots, or ground or back warp-threads, at right angles to the pile-threads between the commencement of the floats of adjoining pile-threads, as above described, and exhibited in the diagrams, figs. 1, 2, 3. Secondly,—cutting or sever-

ing the pile or nap-threads transversely, or from selvage to selvage, after the cloth has been removed from the loom. And, Thirdly,—the construction and arrangement of machinery or apparatus (as before described and shewn in figs. 4, and 5,) for uniformly stretching or distending the fabric laterally and longitudinally during the operation of cutting the pile or nap.—[*Inrolled in the Petty Bag Office, July,* 1846.]

Specification drawn by Messrs. Newton and Son.

To William Smith, *of the city of London, gas-meter manufacturer, for an invention of certain improvements in gas-meters,—being a communication.*—[Sealed 29th June, 1846.]

This invention consists in certain novel arrangements or constructions of the working parts of gas-meters, whereby their construction is much simplified, and they are therefore less liable to derangement than gas-meters of the ordinary construction. The improvements relate principally to that description of gas-meters commonly known as dry meters; but certain of the hereinafter-described improvements may also be applied to water meters, if thought desirable.

In Plate XI., fig. 1, represents a transverse vertical section of a dry gas-meter, constructed according to one of the improved plans; and fig. 2, is a detached plan view, shewing the mode of working the valves. *a, a,* is the case of the meter, which is divided into two chambers A, and B, by a rigid partition *b, b.* The two chambers A, and B, thus formed, are again divided into two parts by the flexible diaphragms *c, c,* which are moved backwards and forwards by the gas, as it alternately enters and leaves the chambers. This reciprocating motion of the two flexible diaphragms is, by means of connecting-rods or arms *d, d,* communicated to a centre shaft *e, e,* which is furnished, at its lower end, with two cranks for that purpose. The flexible diaphragms are secured at their edges, in any convenient manner, to the interior of the case, and also to concave or dish-shaped circular plates of metal *c**, which are supported by being jointed to

one end of a horizontal rod *f*, the opposite end of which is connected, by a joint, to one side of the case. The lower end of the vertical shaft *e, e,* passes through a horizontal recess in the centre partition *b*; two of which recesses are made to allow of the movement of the cranks. Care must be taken to pack the hole through which the shaft passes, in order to prevent the gas from escaping from one chamber to the other. The upper end of the shaft *e*, works in a stuffing-box at the top of the meter, and carries a small worm *g*, which, by taking into a worm-wheel *h*, (seen at fig. 2,) actuates the counting apparatus as usual. At the extreme end of the shaft *e*, and above the worm *g*, is a small horizontal disc *i*, to which the arms or rods *j, j,* which work the covers of the slide-valves *k*, and *k**, are attached, by means of a vertical pin or stud, placed near the periphery of the disc so as to act excentrically, or as a crank. The valves are constructed in the ordinary manner, but the sliding-covers are worked by the excentric pin; so that, as the vertical shaft *e*, is, by the reciprocating action of the flexible diaphragms *c, c,* made to revolve, it moves round the excentric pin or crank of the disc *i*, and alternately opens and shuts the valves *k*, and *k**.

Fig. 3, is a vertical section of another description of dry meter, in which three flexible diaphragms are employed, and the rigid central partition is dispensed with; fig. 4, is a sectional plan view, taken through the dome or upper part of the meter, in the line 1, 2, of fig. 3; figs. 5, represent various detached views of a rotary valve, which may be adapted to this description of dry gas-meter; and figs. 6, represent a four-way rotary valve, which may be adapted to a meter with four measuring chambers, instead of the slide-valves *k*, and *k**, fig. 2. Figs. 7, 8, and 9, shew a novel construction or arrangement of counting apparatus, for ascertaining the number of cubic feet of gas that is passed through the meter; and figs. 11, 12, and 13, represent another and more simple mode of constructing an indicating or counting apparatus for gas-meters. *a, a, a,* is the outer case of the meter; *c, c, c,* are the flexible diaphragms, furnished with thin flat plates of metal *c**, *c**, to which the

connecting crank-arms are attached; and *e, e,* is the centre shaft, which, as the gas flows in behind the diaphragms *c, c, c,* is caused to rotate by means of the connecting crank-arms *d, d, d,* and is supported, at its lower end, by the three-legged or armed bracket *b, b, b.* In the drawing, the connecting-rods or crank-arms *d, d, d,* are represented as jointed to the diaphragm-plates *c**, *c**; but this is not essential, as they may be fixed thereto, and merely allowed to turn on the pin which connects them to the central shaft *e.* The lower end of the vertical shaft *e,* carries a horizontal arm or crank *f,* which has a slot made in it, as seen in the sectional plan view, fig. 4, for the purpose of receiving a regulating or adjusting-pin *g,* to which the connecting-rods or crank-arms *d, d, d,* of the flexible diaphragms *c**, *c**, are attached. This pin *g,* is furnished with a thumb-screw at its upper end, by which it is firmly secured to the arm *f,* at any suitable position. It will now be understood, that by simply moving the pin *g,* in the slot of the arm *f,* either backwards or forwards, as may be required, and securing it at the proper distance along the slot, the measuring capacity of the chambers behind the flexible diaphragms may be regulated and determined, as will be well understood by gas-meter manufacturers.

The gas is not admitted into the triangular central space, formed by the three diaphragms, but is supplied to the meter by the pipe *l,* and passes through the centre of the valve (shewn detached at figs. 5,) into one of the measuring-chambers behind one or other of the flexible diaphragms, and issues therefrom through one of the side apertures in the valve *k,* into the domed chamber *m,* from whence it is carried, by the exit-pipe *n,* to be consumed.

Figs. 3, and 4, represent a gas-meter with only three measuring capacities, which are formed by the spaces or chambers between the back of the flexible diaphragms and the internal sides of the case; and each of these chambers, so formed, must be once filled and emptied for every revolution of the shaft *e,* and valve-cover *o.* As no gas is admitted into the triangular central capacity, where the vertical shaft *e,* and its appendages are situated, the injurious effects of the gas

upon these working parts of the meter will be prevented. The valve *k*, is what is denominated a rotary valve; and as there are three measuring chambers, as above mentioned, the valve-seat must of course have three ways made in it, one communicating with each chamber, and also a centre one, which is kept always open to admit the gas into the meter through the rotary valve-cap *o*. At figs. 5, the valve is represented in plan view, the cap *o*, being removed, so as to shew all the orifices; the three segmental orifices are in communication with their respective measuring-chambers, and the central circular opening is always covered by the cap *o*, which continually directs the gas to one and sometimes to two of the other orifices at the same time. The cap *o*, is shewn detached, and also in its place, at figs. 5. The vertical shaft *e*, passes up the central and circular orifice of the valve *k*, through a stuffing-box *k**, and terminates in a square hole in the top of the valve-cap *o*; the upper extremity of the shaft *e*, being made square for the purpose.

The gas enters the meter, as above mentioned, by the pipe *l*, and passing to the circular orifice in the centre of the valve *k*, it rises up into the chamber of the cover *o*, (as shewn by the arrows in fig. 3,) and descends through one of the side orifices 3, of the valve into a pipe 6, communicating with one of the chambers formed behind the flexible diaphragms; and as the diaphragm belonging to the chamber that is being filled with gas advances, it causes the shaft *e*, to move round, and consequently carry round the cap *o*, with it, thereby shutting off the communication with the filled chamber, and opening a communication with the adjoining empty one. While this is going on, the third chamber, which was previously filled, is emptying itself through its orifice in the valve *k*, into the dome *m*, which, in order to prevent the lights from oscillating or being affected by the sudden change of the valves, should be made as large as it conveniently can be, so as to hold a considerable body of gas. From the dome *m*, the gas passes out of the meter through the pipe *n*, to be consumed; and if more than three measuring-chambers are employed, of course the number of orifices in the valve *k*, must be made to correspond: for instance, in the meter shewn at fig. 1, there are

four measuring-chambers; if, therefore, a rotary valve, of the construction just described, were applied to this meter in place of the one shewn at fig. 2, it would be necessary to construct the valve-seat and cap as shewn at figs. 6.

The counting or registering apparatus is worked by a worm *g*, fixed on any convenient part of the vertical shaft *e*; and any suitable construction of counting or registering apparatus may be employed in connection with the improved arrangement of parts above described; but the patentee prefers to employ the registering apparatus shewn at figs. 7, 8, and 9, or that shewn at figs. 11, 12, and 13. Fig. 7, is an elevation of the improved apparatus, the face-plate being removed, in order that the internal arrangement may be more clearly seen; fig. 8, is a sectional plan view, with the top plate removed; and fig. 9, is an end view of the apparatus. The vertical shaft, which is worked directly by the action of the flexible diaphragms, is seen at *e*, and carries, at its upper end, a horizontal barrel *q*, which is graduated and marked to indicate the units. The vertical shaft *e*, is also furnished with a worm *g*, which takes into and drives a worm-wheel *h*, on the axle or shaft of a spring-clutch or barrel. This clutch is divided into two parts *r*, and *r**, one of which, *r*, is connected to and revolves with the worm-wheel *h*, and the other *r**, is mounted loosely on the shaft, to allow the shaft to revolve without carrying this part of the clutch round with it. The faces of the two parts of the clutch, which are contiguous to each other, are inclined, and are kept in contact by means of a coiled spring *s*. To the part *r**, of the clutch is attached a long spring or lever *t*, the opposite end of which bears on and abuts against the teeth of a ratchet-wheel *u*, on the upper end of a vertical shaft or spindle 6. It will now be seen that as the vertical shaft *e*, revolves, it will, by means of the worm *g*, and worm-wheel *h*, cause the larger or left-hand part *r*, of the clutch to rotate, and thereby push back the other end *r**, of the clutch laterally on the shaft, and compress the spring *s*; but when the clutch-barrel *r*, has made an entire revolution in the direction of the arrow, and the point 1, has arrived at and passed the point 2, of the part *r**, (which it will do once for every ten revolutions of the shaft *e*,) the spring *s*,

will cause the part r^*, to jump forward, and carry the long spring or lever t, with it, which will, by this action, come against one of the teeth of the ratchet-wheel u, and suddenly force it round to the extent of one tooth, or one-tenth of a revolution. On the shaft of the ratchet-wheel u, but beneath that ratchet, is a peculiarly-shaped wheel v, with ten teeth, (shewn detached at fig. 10) in gear with a wheel w, provided with a similar number of teeth, and mounted on the lower end of a vertical shaft 7; consequently, every motion of the ratchet-wheel u, is communicated to the wheel w. The spindle 7, is provided, at its upper end, with a graduated horizontal barrel x, which, as it makes one revolution for every ten of the clutch-barrel r, r^*, or for one hundred revolutions of the shaft e, will indicate the hundreds of feet of gas measured. Just above the wheel w, and on the same spindle, is another wheel y, which has only one tooth. The one tooth of this wheel is made to take into the teeth of a wheel w^1, on the next spindle 8, (which wheel w^1, is precisely similar in construction to the wheel w); and as the wheel y, has one tooth only on the whole of its periphery, the wheel w^1, will be moved only to the extent of one tooth for every entire revolution of the wheel y; consequently, the figures on the horizontal barrel x^1, of the spindle 8, will mark the thousands. A wheel y^1, with a single tooth, and similar in construction to y, is made to take into another wheel w^2, on a third spindle 9, which is also furnished with a graduated barrel x^2, with figures thereon, and indicates the tens of thousands of cubic feet of gas that have passed through the meter. This barrel is actuated to the extent of one tooth of the wheel w^2, or a tenth of a revolution for every entire revolution of the spindle 8, and its wheels w^1, y^1. In this manner any number of spindles and wheels may be used, as required. The figures on the graduated barrels of the spindles 7, 8, 9, are seen through apertures made in the front plate, as usual; and as the barrels are only moved periodically by jumps, the figure will always be in the middle, and perfectly legible.

Upon referring to the detached plan view, fig. 10, it will be seen, that the spaces between the teeth, recesses, or indentations of the wheels w, w^1, and w^2, are concave, and are

made to fit or bank against the plain part of the wheels v^1, y^1, and y^2; and, therefore, the wheels y, and y^1, may continue to revolve without actuating the wheels w^1, and w^2, until the single tooth of the wheels y, and y^1, comes round and takes into one of the recesses or indentations of the wheels w^1, w^2, when these latter will be moved round one-tenth of a revolution, as already mentioned; but no part of the mechanism connected with the indicating barrels can be moved, except by causing the alternate dilatation and contraction of the measuring-chambers; consequently, fraudulent measurement is effectually prevented.

At figs. 11, 12, and 13, are different views of a construction of registering apparatus, which is more simple and less expensive to manufacture than the one just described. In place of employing two wheels, such as w, and y, to each spindle, as in the former instance, one is here made to serve the double purpose of receiving motion from, and communicating motion to, contiguous wheels belonging to the other spindles on each side. Fig. 11, represents a plan view of the apparatus; fig. 12, is a view of one side of the wheels, arranged in their respective places, but with the front plate of the apparatus removed; and fig. 13, is a similar view of the opposite side of the wheels, the back-plate being removed. Each of these wheels or discs is furnished, on one side, with ten pins or studs 1, 1, 1, placed equidistant round the disc and near its periphery, as seen at fig. 13; and on the opposite side of the wheel or disc there is a raised edge or flange 2, 2, passing nearly all round the edge of the disc or wheel, but leaving a gate or opening, as at 3, which is divided into two parts by a wiper 4, secured by rivets, or in any convenient manner, to the face of the disc or wheel. Wheels or discs, constructed in this manner, are mounted on spindles in precisely the same manner as the wheels w, and y, in the former figures; and indexes, pointers, discs, barrels, or spheres, with figures marked thereon, are mounted on the ends of these spindles; and one of the pins or studs of one wheel or disc is placed inside the raised edge or flange of the adjoining one, as seen in the figures. The action of the parts is as follows:— Motion being communicated, either by means of a worm and

worm-wheel, as in the plan above described, or in any other convenient manner, from the interior working parts of the meter to the shaft 5, of the wheel *v*, this wheel will be caused to revolve, having one of the pins of the second wheel *w*, within its flange, as shewn by dots in fig. 12. The wheel *w*, will, however, remain stationary until the wiper 4, of the wheel *v*, comes round; but when this takes place, and the wiper comes against the pin of the wheel *w*, it forces the said pin forward; but, at the same moment, another pin belonging to *w*, enters the opening behind the wiper, and remains stationary within the flange until the wiper comes round again. The action of the other wheels or discs is precisely similar, and therefore need not be more particularly described; it will only be necessary to say further, that for every entire revolution of the wheel *v*, the wheel *w*, makes one-tenth of a revolution; and for every rotation of the latter, the wheel *x*, makes one-tenth of a revolution, and so on, as in the former instance. It will be evident, that the spring clutch-barrel *r*, *r**, of figs. 7, 8, and 9, may be applied to this construction of counting apparatus; the operation of both arrangements being precisely similar, except that indexes, needles, or revolving discs are used in place of the spheres or barrels above shewn.

The patentee, in conclusion, remarks, that although, in order to render the improvements perfectly clear and intelligible, he has shewn and described certain parts of gas-meters which are well known and in use—some of which have been previously patented by himself, he does not intend to claim such parts as constituting a portion of the present improvements; but that which he claims is, Firstly,—the employment of a rigid central partition between two flexible diaphragms, which, by means of cranks, are made to actuate a central vertical shaft, as above described; and also the peculiar mode above shewn, or any modification of the same, for working the slides of the valves. Secondly,—the mode of constructing gas-meters with three or more flexible diaphragms, so that the gas to be measured is kept away from or not allowed to come in contact with the working parts and joints. He claims, particularly, passing the vertical shaft *e*, up through the centre of the valve, and working the same direct, or without the

intervention of any intermediate gearing. Thirdly,—the mode, above shewn and described, of constructing periodical jumping indexes or counting apparatus; and also the employment of a spring clutch-barrel, as shewn at *r*, *r**, or any modification thereof, to an indicating or registering apparatus for gas-meters, whereby the wheels or moving parts are actuated periodically, as above shewn and described. He also claims the exclusive right to apply a clutch-barrel of this description to any and every construction of index for gas-meters, in which a periodical jumping motion is required.—[*Inrolled in the Petty Bag Office, December*, 1846.]

Specification drawn by Messrs. Newton and Son.

To David Davies, *of Wigmore-street, Cavendish-square, in the county of Middlesex, coach-maker, for certain improvements in steps for carriages and other purposes,—being a communication.*—[Sealed 17th September, 1846.]

This invention consists in supporting carriage and other steps upon a geometrical arrangement of parallel levers, to which motion is communicated, for the purpose of raising and lowering the steps, by turning a shaft, forming part of the apparatus: the shaft may be caused to turn by the act of opening and closing a door, or by the use of a handle.

The mode of applying this invention to carriages is shewn in Plate XII., at figs. 1, and 2; fig. 1, exhibiting the carriage-step and parts connected therewith, as they would appear when seen from the back of the carriage, and fig. 2, being a perspective view of the same. Under the carriage-body, on each side, is fixed a quadrangular iron box or frame *a*, which receives the step and its supporting levers when they are in a closed state. *b*, *b*, are two bars or levers jointed to the frame *a*, by bolts at *c*; *d*, *d*, are two similar bars or levers fixed on a square shaft *e*, which turns in bearings in the sides of the frame *a*; and *f*, is the step supported by two bars *g*, *g*, jointed to the bars *b*, and *d*: by this arrangement the bars *b*, and *d*, will always move parallel to each other, and the bars *g*, will move parallel to the frame *a*.

On one end of the shaft *e*, is fixed a lever *h*, at right angles to the bars *d*; the end of this lever is furnished with a connecting piece, which enters between and is jointed to the forked extremities of a bar *i*; and the bar *i*, is connected by a right-angled link *j*, to a step-piece *k*, fixed to the door of the carriage. When the carriage-door is shut, the bars *b*, *d*, and the step *f*, are in a closed state within the box *a*, the bar *i*, is in an inclined position, and the lever *h*, is in a vertical position (its end extending through the opening at the end of the bar *i*,). When the door is opened, the step-piece *k*, by means of the link *j*, draws forward the bar *i*, which, by reason of its connection with the lever *h*, raises that lever into a horizontal position, thereby causing the shaft *e*, to turn and depress the bars *b*, *d*, until they come into a vertical position: by this means the different parts will be brought to the positions shewn in the figures, and the step *f*, projected in readiness for use. On the door being closed, the parts will return to the positions first described. The step is securely retained in its position, when either up or down, by means of a strong bent steel spring *l*, which presses on the square shaft *e*, and prevents it from moving until acted on by the lever *h*,—two springs may be used, one above and the other below the shaft; and the patentee prefers two springs when more than one step is employed. The dotted lines in fig. 2, are intended to shew that the application of this invention is not confined to a single step, but that any required number of steps may be let down and drawn up into the frame *a*, by the movement of the shaft *e*. In carriages which have no doors, such as phaetons, the step may be raised and lowered by turning a handle, applied to the lever *h*, or acting on the shaft *e*, in any other manner.

A set of steps and their appendages, constructed according to this invention, may be applied to the back door of a house or other building opening into a garden or yard on a lower level; so that on opening the door, the steps will be lowered, and, on closing it, they will be drawn up into the frame or recess provided for their reception, whereby the communication from below will be cut off. The invention may also be used as a means of escape from fire in a building which is higher than, or detached from, the adjacent buildings.

The patentee claims the mode of constructing and supporting a step or steps upon a geometrical arrangement of parallel levers, as above described; so that on giving motion, by a central shaft, to such levers, the step or steps may be raised or lowered at pleasure. And he claims, generally, the application to carriages of a step or steps constructed and arranged as above described; whether such step or steps is or are raised and lowered by the opening and shutting of the carriage-door, or by the motion of some handle suitably placed for that purpose. He also claims, generally, the application to buildings of a step or steps constructed and arranged as above described; whether they are raised and lowered by the opening and shutting of a door, or by the motion of some handle suitably placed for that purpose.—[*Inrolled in the Inrolment Office, March,* 1847.]

To Henry Franklin, *of Marston Mortaine, in the county of Bedford, brick-maker, for improvements in the manufacture of bricks, tiles, and other like articles.*—[Sealed 17th September, 1846.]

This invention of improvements in the manufacture of bricks, tiles, and other like articles, consists in certain apparatus by means of which the processes of pugging, screening, and moulding may be performed in one machine.

In Plate XIII., fig. 1, is an elevation, and fig. 2, a vertical section of the machine. *a*, is a cylinder, divided into two portions by a rectangular chamber *b*, and terminating at the bottom in another rectangular chamber *c*. *d*, is a double-threaded cast-iron screw, the largest diameter of which is nearly equal to the internal diameter of the cylinder; the axis *e*, of the screw works in bearings carried by the cover *f*, and by the cross-bar *g*, fixed on the top of the chamber *c*; the screw-threads are made of the shape exhibited in the sectional view fig. 3, *i. e.*, flat on the upper side and curved on the under side, so as to give the clay a tendency to move outwards from the centre of the cylinder, as it is forced downwards by the rotation of the screw. The screw-threads

are cut away at that part of the screw which is within the chamber *b*, in order that two screen-frames *h*, (see the detached view fig. 4,) may be introduced through openings in the side of the chamber, covered by the doors *i*, *i*:—one of these doors is shewn open and the other closed. *j*, is a curved wiper fixed to the axis *e*, immediately above the screens, for the purpose of sweeping off stones, twigs, straw, or any other extraneous substances which may accumulate on their surfaces, and carrying such matters into the angles of the chamber *b*, from whence they may be removed, as often as found necessary, through the doors *i*, *i*. *k*, *k*, are two mould or die-plates, suitable for making pipes; but any other mould-plates may be used. *l*, *m*, are endless webs mounted on rollers in the frames *n*, *n*, to receive the moulded material as it issues from the machine. *o*, *o*, are frames that slide through holes in the uprights *p*, *p*, and are raised and depressed by means of the levers *q*, *q*; these frames carry wires *r*, *r*, which serve as knives for cutting off the moulded clay to the required length. *s*, *s*, is a vessel containing water, which is allowed to drop slowly on the screw-threads, in order to lessen the friction and facilitate the passage of the clay through the machine.

The mode of manufacturing the bricks, tiles, or other articles is as follows:—The clay or other plastic material is fed into the machine through the opening *t*, and the screw *d*, being made to rotate, forces the same downwards through the screens *i*, by which any stones or other non-plastic materials are intercepted; the lower portion of the screw then forces the clay through the mould-plates, and the moulded material is received by the endless webs; after which it is cut into suitable lengths, by means of the wires, and removed from the webs by hand.

Instead of the pugging, screening, and moulding of the clay being successively performed in one machine, these processes may be performed separately, by dividing the machine into several parts suitably modified. For example, the pugging and screening may be effected by a machine consisting merely of the upper part of the machine shewn at figs. 1, and 2; the cross-bar *g*, being fixed directly under the screens

h, h. Or, the moulding may be effected by a machine consisting of only the lower part; the cover *g*, being then in the same position as that which the screens occupy in the combined machine.

The patentee claims, Firstly,—the combination in one machine of a pugging cylinder, discharging screw (of the peculiar form aforesaid), screening frames, moulding dies, cutting-frames, and other appendages, as above described; whereby the processes of pugging, screening, and moulding, are successively performed, as if by one operation, and a greater quantity of bricks, tiles, and other like articles are manufactured in a given time with less trouble and less expense than heretofore. Secondly,—the parts of the said machine which relate respectively to pugging and screening, whether they be all combined together in one machine, as above described, or used separately with suitable modifications. Thirdly,—the employment, for the purpose of manufacturing bricks, tiles, and other like articles, of the screw, of the peculiar form above described; whether the same is employed in a machine of the above construction or in any other machine used for a like purpose.—[*Inrolled in the Inrolment Office, March,* 1847.]

To Richard Wright, *of Hermitage-terrace, in the parish of Bow, in the county of Middlesex, sugar-refiner, for improvements in refining sugar.*—[Sealed 6th July, 1846.]

This invention consists in certain improvements in refining and improving the quality of raw sugars.

The building or sugar-house, in which the invention is carried out, should not be less than forty feet high, with three or four floors. A sheet-iron cylinder, thirty inches in diameter and twenty-five feet long, is to extend from the upper floor downwards through the next; to the top of the cylinder, which should be about one foot above the upper floor, is to be fitted a funnel, two feet long, and about three feet in diameter at its upper part; and in the side of the cylinder, at distances of about five feet apart, small steam-pipes (half an inch in diameter, and connected with a main-

pipe from a steam-boiler) are to be inserted, with their ends turned downwards inside the cylinder. A large box for receiving the sugar is to be placed on the floor beneath the lower end of the cylinder.

The mode of operating on the sugar is as follows:—The sugar is first roughly broken or ground, and then steam, at a pressure of from forty to fifty pounds on the square inch, is turned on from the boiler, and the sugar is passed through a coarse sieve (having the wires fixed half an inch apart) suspended over the funnel. In falling through the cylinder into the box, the sugar becomes warmed and slightly moistened, and in this state it is to be placed in a powerful press, by which the coloring matter will be expelled. Previous to being placed in the press, the sugar is formed into cakes, about eighteen inches square and three or four inches thick, and between these cakes pieces of coarse linen, cloth, or other suitable material are introduced. At the expiration of three or four hours, the sugar is removed from the press, and passed through a mill, when, as the patentee states, it will be in good marketable condition, and of a fine color.

The drainage from the press, which contains sugar, coloring matter, and a gummy adhesive matter, termed uncrystallizable sugar, is treated as follows:—It is dissolved in as much boiling water as will produce a mixture indicating 20° on Beaume's saccharometer, and to every hundred gallons is added from a pound to a pound and a half of sulphuric acid, of 1·845 sp. gr. previously mixed with one gallon of water. After the solution has been boiled for five minutes, the acid is neutralized with carbonate of lime or chalk, and the solution of sugar is boiled with animal charcoal in the usual way, or filtered.

The process of filtration is performed in the apparatus represented in Plate XIII. a, a^1, are four filtering cylinders, open at top and closed at the bottom, where suitable cocks b, b, are fixed; and c, c^1, are four cisterns, furnished with cocks d, d, and used for supplying the cylinders a, a. e, e^1, are four cisterns, for receiving the filtered syrup, connected by short pipes f, f, furnished with cocks g, g, to the main pipe h; this pipe communicates with the pump i, by which the

syrup is forced up through the pipe *j*, and its branch pipes into the cisterns *c*, *c*; the supply being regulated by the cocks *k*, *k*. *l*, *l*, are steam-pipes, by which the syrup is kept at an elevated temperature in the cisterns *c*, *c*, and *e*, *e*. The syrup to be operated upon is introduced into the first cistern c^1, and descends through the filter a^1, into the cistern e^1, beneath; then, if the syrup is not sufficiently decolored, it is raised by the pump *i*, into the second cistern *c*, from which it descends through the second filter *a*, into the cistern beneath; and in this way the syrup may be passed through all the filters. When the first filter becomes exhausted, it is recharged, and is then used as the last one of the series. After filtration, the syrup is evaporated to a suitable density, and then transferred to iron pans with conical bottoms, holding from fifty to two hundred gallons each: these pans are employed instead of the moulds or forms commonly used by sugar-refiners in the process of crystallization. The sugar thus obtained, may, if required, be made into cakes, and placed in the press for four or five hours; it may then be ground and packed for sale. If found requisite, the sugar may be placed on trays in a drying-room for a few hours, previous to being warehoused.

The patentee claims, Firstly,—the process of refining sugar by submitting it to the action of high-pressure steam and pressure. Secondly,—the use of sulphuric acid in cleansing solutions of sugar, and in promoting their crystallization. Thirdly,—the mode of arranging the filtering apparatus, as above described.—[*Inrolled in the Inrolment Office, January,* 1847.]

To John Taylor, *of the Adelphi, in the county of Middlesex, Gent., for improvements in the manufacture of explosive compounds,—being a communication.*—[Sealed 8th October, 1846.]

This invention, which has already attracted so much notice, under the name of "Schoenbein's gun-cotton," consists in the manufacturing of explosive compounds, applicable to

mining purposes, the throwing of projectiles, and otherwise, as substitutes for gunpowder, by subjecting matters of vegetable origin to the action of acids.

The substance which the patentee prefers to operate upon is cotton in the state in which it is brought to this country, but freed from extraneous matters, and perfectly dry. The acids used are nitric acid, of from 1·45 to 1·50 sp. gr., and sulphuric acid, of 1·85 sp. gr.; and these are mixed, in the proportion of one measure of nitric acid to three of sulphuric acid, in a vessel of glazed earthenware or other material not acted on by acids. By this admixture great heat is produced, and the mixture must be allowed to cool down to a temperature of 50° or 60° Fahr. The cotton, in a loose open state, is then put into the mixture; and, in order to ensure the thorough impregnation of the cotton with the acids, it is stirred with a rod of glass or other substance capable of resisting the action of acids; after which the mixture is drawn off. The cotton is gently pressed in the vessel containing it, by a presser of glazed earthenware or other suitable material, in order to expel part of the mixture, and is then covered and left for an hour; at the expiration of this time it is again pressed, to remove as much of the acids as is practicable; after which, the cotton is washed in a continuous flow of water, by stirring it therein, until the water which runs off is found to be perfectly free from acid, on testing it with litmus paper. The cotton is now pressed to expel the water; and in order to ensure the cotton being perfectly free from uncombined acid, it is dipped into a very weak solution of carbonate of potash (composed of one ounce of carbonate of potash to one gallon of water), and then subjected to pressure, to discharge the same. At this stage of the process, if the cotton were to be thoroughly dried, it would be highly explosive; but, to increase its strength, it is next immersed and thoroughly stirred in a weak solution of nitrate of potash, prepared by dissolving one ounce of nitrate of potash in one gallon of water: the use of the solutions of carbonate and nitrate of potash may, however, be dispensed with. The cotton is pressed to free it from the solution of nitrate of potash, and is then opened out and dried: the drying may

be effected by spreading it thinly on surfaces in a room heated by steam or otherwise, to about 150° Fahr. When dry, the cotton is ready for use.

Nitric acid alone produces on cotton a similar effect to that produced by the mixture of nitric and sulphuric acids; but when nitric acid is used, the cotton should be washed immediately after it has been soaked in the acid.

The patentee does not confine himself to the use of cotton; for other matters of vegetable origin may be converted into explosive compounds by the same acids. Neither does he confine himself to the use of nitric acid or sulphuric acid of the specific gravity above mentioned.

With regard to the use of the explosive compound, three parts of it, by weight, will be equal in strength to, if not more powerful than, eight parts, by weight, of Tower-proof gunpowder; and still less of the compound may be employed, when it is substituted for gunpowder of an inferior quality. The explosive compound may be rammed into a piece of ordnance or a musket; or it may be made into cartridges; or, when slightly damp, it may be pressed in moulds corresponding to the different calibres of pieces of ordnance, fowling-pieces, &c., and, after being dried, it will retain the desired shape. When placed in caps, similar to the ordinary percussion caps, the compound may be discharged by impact.

The patentee does not confine himself to the above details, so long as the peculiar character of the invention be retained; and he claims the manufacture of explosive compounds from matters of vegetable origin, by means of nitric acid, or nitric and sulphuric acids.—[*Inrolled in the Inrolment Office, April*, 1847.]

To François Teychenné, *of Red Cross-square, Cripplegate, in the city of London, feather merchant, for improvements in treating stone, to render it hard and impermeable, and in coloring the same,—being partly a communication.*—[Sealed 10th August, 1846.]

This invention consists in rendering soft and porous stone hard and impermeable, and imparting a color thereto, by

immersion in a boiling or highly-heated solution, prepared in the manner hereafter described.

The stone is dried and cut to the form and size required, before being immersed in the solution. The principal materials used for forming the solution, when the stone is required to be black, brown, or of a dark color, are coal-tar, pitch, bitumen, mineral-pitch, and a small quantity of fine sand;—the solid bitumen, termed "resinoide," which gives a brilliant surface to the stone, in addition to hardening it, may also be employed. The proportions vary according to the quality of the stone; but a useful mixture is produced by combining eighty-five parts of coal-tar, ten parts of bitumenous matters, three parts of tallow or other fatty matters, and a portion of linseed or other drying oil. These materials are introduced into a boiler, and brought to a state of ebullition; the pieces of stone (which have been enclosed in frames, in order that they may be easily moved) are then immersed in the boiling mixture by means of a crane or other suitable apparatus, and the boiling is continued until the stone is impregnated to the required depth: in two hours the mixture will have penetrated to the depth of one inch, in four hours to two inches, and in eight hours to four inches; but for large blocks, the time required will be from eight to forty-eight hours. The patentee prefers to cover the vessel while the liquid is boiling, and to conduct the gases from the upper part of the boiler, by means of a tube, into a suitable receptacle, wherein they may be condensed.

Sometimes the surfaces of stones that are very porous will not become completely saturated; when this is found to be the case, the patentee removes the stone from the boiler, and allows it to cool. He then takes a quantity of the solution, and adds thereto some chalk, iron-rust, granite, marble, and any earthy carbonate, all finely pulverized; these ingredients are boiled together, and are applied in a boiling state to the surface of the stone, and rubbed in with a hot iron.

If the stone is required to be of a light color, instead of coal-tar being used as the base of the solution, the whitest resin that can be obtained is employed, in the proportion of

eighty parts of the latter in place of the eighty-five parts of the former, before mentioned. Turpentine, and all kinds of oils, wax, and fatty matters are also used, in the proportion of 15 per cent.; and all kinds of gum may likewise be added, according to the nature of the stone. If the stone is to have a clear white color, the patentee mixes with the materials last mentioned a preparation of the following ingredients, reduced to a fine powder, or mixed in a state of paste, viz., white lead, carbonate of lime, carbonate of zinc, pipe-clay (which does not contain any iron), and potters' clay. When other colors are required, an addition is made to the materials last described of the matters suitable for giving the required color, which are,—for red, red lead, oxide of iron, Chinese vermillion, Chinese red, or dragon's blood;—for green, acetate of copper, or Brunswick green;—for blue, Prussian blue, or cobalt;—for yellow, ochre, or gamboge.

The patentee claims, Firstly,—the mode of acting upon dried, soft, and porous stones, so as to render them hard and impermeable, with the materials above described, in a boiling or highly-heated state. Secondly,—the coloring of stone, as above described.—[*Inrolled in the Inrolment Office, February,* 1847.]

To NICHOLAS HARVEY, *of Hoyle Foundry, in the parish of Saint Earth, in the county of Cornwall, for certain improvements in filtering of water for steam-engines and boilers.*—[Sealed 3rd September, 1846.]

THIS invention consists in certain apparatus for filtering the water to be used in steam-engine boilers.

In Plate XII., fig. 1, is a vertical section, and fig. 2, a plan view of one arrangement of filtering apparatus. *a,* is the external casing; *b,* a fixed perforated plate, for supporting the filtering material *c,* which may consist of sponge or other suitable substance; and *d,* is a moveable perforated plate, resting upon the filtering material;—the pressure being regulated by the application of weights *e, e,* to the upper end of a rod *f,* which is secured to the centre of the plate *d.* *g,* is

a pipe for the admission of water from the feed-pump into the apparatus; and *h,* is the pipe that conveys the filtered water to the boiler. *i,* is an inverted conical plate placed below the pipe *g,* and having a hole in its centre through which the mud descends into the chamber *j*: the mud is drawn off from the chamber through the pipe *k,* and run into the sea or into the common drain. The plate *i,* is intended to prevent the mud from being disturbed by the action of the water from the feed-pump: *r,* is a funnel and cock, by means of which oil can be introduced into the boiler, or water may be admitted to wash the filtering material. The water is forced by the feed-pumps into the apparatus through the pipe *g,* and, ascending through the filtering material, is deprived of its impurities, which fall into the chamber *j,* while the purified water passes off by the pipe *h,* to the boiler.

If the water be very dirty, the patentee uses a double filtering apparatus, shewn in plan view at fig. 3; the same letters of reference being used for corresponding parts as in the preceding figures. The apparatus consists of two filtering cylinders, connected by the three-way cocks *l, m,* with the pipes *g,* and *h*; so that if one set of sponges become choked or filled with impurities, the water may be caused to pass through the other filtering cylinder, by turning the cocks *l, m*; and thus one set of sponges may be taken out and cleansed while the other set is in operation.

Fig. 4, exhibits the mode of applying this invention to the hot-well of a steam-engine, so as to filter the water before it enters the feed-pumps. *n,* is the hot-well; *o,* the air-vessel; *p,* the delivery pipe; and *q,* the pipe leading to the feed-pumps. The only difference in the action of this apparatus and the one previously described is, that in this instance the feed-pumps draw the water through the sponges, whereas in the former case the feed-pumps forced it through the filtering material.

The patentee claims, Firstly,—the manner of placing the inverted conical diaphragm *i,* and the stationary perforated plate *b,* having the ingress pipe between; also having a chamber *j,* below, for the reception of mud or sediment, and the manner of carrying the mud off by the pipe *k*; also the man-

ner of placing the sponge or filtering material between the stationary perforated plate *b*, and the moveable plate *d*, being acted upon by the weights *e*, and spindle *f*, as shewn at figs. 1, and 2. Secondly,—the manner of combining two filtering cylinders together, and so arranging the ingress and egress pipes that the water may be passed through either, by means of the three-way cocks *l*, and *m*, as shewn at fig. 3. Thirdly,—the mode of applying the single or double cylinder filterer, as before described, to the hot-well of a steam-engine, as shewn at fig. 4.—[*Inrolled in the Inrolment Office, March*, 1847.]

To MOSES POOLE, *of the Bill Office, Gent., for improvements in the manufacture of terry and cut piled fabrics,—being a communication.*—[Sealed 17th August, 1846.]

THESE improvements in the manufacture of terry and cut piled fabrics consist in applying power to drive the looms for weaving the same, in such a manner that the motions of the loom will be suspended when the shed has been opened to receive a wire; the object being to relieve the weaver of the labour of working the loom by his feet and hands, but leaving to him the duty of introducing the wires, and also of cutting the yarns, when manufacturing cut piled fabrics. In weaving terry goods, the weaver may likewise withdraw the wires; but it is preferred to have a second person to draw the wires from the fabrics made by several looms.

This invention may be carried out by various arrangements of machinery; but the patentee states that it will be best accomplished by communicating motion to the loom through the agency of friction surfaces. The loom is to be harnessed and arranged for weaving carpets, velvets, and such like fabrics, in the usual way. On the main shaft of the loom is fixed a drum, formed with a recess in its periphery, and covered with leather or other suitable material for producing a friction surface; it is driven by another friction-drum or roller, fixed on a shaft which receives motion from the steam-engine or other first mover. The different parts are so arranged, that in one revolution of the first drum the loom

will go through all its movements, and the recess in this drum coming opposite the periphery of the second drum, the loom will stop when the shed has been opened to receive a wire. The weaver then introduces a wire into the open warp, and, by means of a lever, communicates motion to the main shaft of the loom, so as to bring the periphery of the first drum again in contact with the periphery of the second; by which means the loom will be caused to go through another series of movements, until the recess in the first drum again comes opposite the second drum.

The patentee claims the so applying power to a loom, when weaving terry or cut piled fabrics by the aid of wires, that the loom may stop when the shed is open for the introduction of a wire.—[*Inrolled in the Inrolment Office, February*, 1847.]

To George Phillips, *of Park-street, Islington, in the county of Middlesex, chemist, for an improved construction and arrangement of apparatus for supporting garden-pots and improving the growth of plants.*—[Sealed 17th August, 1846.]

This invention consists in enclosing pots, in which plants are grown, in a metal case, in such a manner that a reservoir may be formed below to receive the water or liquid as it drains from the pot; and also that evaporation may, to a great extent, be prevented; by which means, the roots of the plant will be kept free from a superabundance of moisture, and the atmosphere will be allowed free access to the roots. In carrying out this object, the flower may be planted either in an ordinary porous carthern garden-pot, or in a perforated metal-pot, constructed for the purpose, so as to form part of the improved apparatus. With this single difference, both plans are precisely similar in principle of construction, although it will be seen, by referring to the figures in Plate XII., that they vary widely in external form and appearance; one of the improved apparatus, as therein shewn, being intended for an herbaceous plant, such as a fuschia, or pelargonium and the other for bulbous roots, such as hya-

cinths. Fig. 1, represents a vertical section, taken through the middle of an apparatus in which an ordinary earthen garden-pot is employed. *a, a, a,* is the external case, which is constructed, by preference, of zinc; this case *a, a,* may be ornamented externally, by japanning, painting, or otherwise, and made of any form that may be desired. *b, b, b,* is a moveable metal frame, shewn in side view at fig. 2; it consists of two upright sides, connected together at or near their lower ends by cross-stretchers *b*, b**, and is furnished at the upper ends with rings or handles *e, e,* which allow of the frame being easily removed from the case. Ledges *d, d,* are formed on the inner sides of the uprights *b, b,* for supporting a piece of wood *c,* on which the garden-pot rests; and as there is more than one pair of ledges, the piece of wood *c,* may be placed at different heights to suit pots of different sizes. The garden-pot *f,* with the flower planted therein, having been placed on the wooden support *c,* the moveable frame *b, b,* is lowered, by means of the handles *e, e,* into its place in the case *a, a.* The handles *e, e,* are then bent down, as shewn in fig. 1, and if the pot *f,* is too small to fit the frame, small wedges *f*, f**, made of cork or other suitable substance, should be pressed between the sides of the pot and the uprights *b, b,* to keep the pot steady in the centre of the case. It will be seen that there is a considerable space between the under part of the garden-pot *f,* and the bottom of the case *a,* forming a reservoir to collect the drainings from the garden-pot *f;* the water that from time to time collects in this reservoir, may be drawn off by removing the plug *g;* and its level can be easily ascertained by means of the small lip or spout *h,* which is open to the reservoir. When the water rises in the reservoir to the height represented by the dotted lines in the figure it must be drawn off, by removing the plug *g;* but as this water will contain a considerable portion of the inorganic salts which have been washed out of the earth, but which form part of the food of the plant, the water must be poured again on to the mould in the pot, so that none of the virtues of the inorganic salts may be lost; and in order to prevent a too rapid evaporation

of the water, the pot is covered with a moveable lid, of peculiar construction, which will admit of the stem of the plant rising up, and passing through, or between, its moveable parts, as shewn in the drawing. This moveable lid is formed in two parts, which meet and enclose the stem of the plant; one-half, or one of the parts of this lid or cover, is shewn detached in plan at fig. 3, and in edge-view at fig. 4. It consists of a flat piece of zinc, or other suitable metal or substance *i*, *i*, the outer edge of which is made to fit the inside of the case *a*, and rest upon a ledge, as shewn in fig. 1; so that when the second or corresponding piece *i*, *i*, is placed on the ledge, it will cover up and fit the case. A sliding piece *j*, *j*, furnished with a stud or button, is attached to the piece *i*, *i*, and is made to slide thereon, so as to adapt itself to the thickness and position of the stem of the plant.

As most flowers require some support while growing, the lower end of an upright wire *k*, is inserted into a socket made in the upper end of the case, and this upright rod is furnished with one, two, or more spring clips or holders *l*, and *m*, for supporting or holding back the branches, leaves, or flowers of the plant. These clips are formed of thin wire, and may either be made (as shewn at *l*), to embrace the whole of the branches, or (as at *m*,) merely to hold back or support a particular branch, stalk, or flower. The extremities of the large spring-holder *l*, are merely hooked together, as shewn in fig. 1; but the fingers of the smaller holder are opened or closed by sliding a small ring *n*, along the arms, as seen best in the detached figure 5. These clips or holders may be placed at any required height on the upright rod *k*, up and down which they may be slidden with ease, as the socket at the end of the clips or holders merely consists of two or three convolute coils of wire, leaving a circular hole in the middle. Other clips or holders, of different construction, may be employed, and the number of such clips or holders will of course depend upon the nature of the plant and other circumstances.

It will be sometimes found desirable to make the apparatus as compact as possible, as, for instance, for growing hyacinths

and other bulbous roots, which are frequently placed on mantel-pieces; and in order to do this, a perforated metal-pot is substituted for the ordinary porous pot, as the former can be made to fit the external case, and will also occupy less room than the clay-pot. Fig. 6, represents the apparatus in vertical section; and fig. 7, is a plan view of the same. *a, a,* is the external case, as in the former instance, and *f, f,* is the metal-pot, which is perforated at the bottom and sides, and is shewn detached, in elevation, at fig. 8. The perforated metal-pot *f,* is furnished with a flange *o, o,* at its upper end, whereby it rests on the shoulder of the external case; the space below the pot *f,* is intended to receive the water or liquid that drains from the mould or earth in the pot, as in the former instance. In order to prevent the earth or mould from being carried through the holes in the perforated pot into the space below, by the percolation of the water, the pot is furnished with a bag *p, p,* made of flannel or other porous material, in which the mould or earth is placed, and the bulb or root is planted. When the pot *f,* is placed in the case *a, a,* the covers *r, r,* are to be laid thereon, as in the former instance; and an upright rod, furnished with spring-clips or holders, as shewn, may be employed, if thought desirable, for supporting the leaves and flowers.

The patentee claims the apparatus above described, or any modification thereof, whereby any superabundant moisture in the mould-pot is allowed to drain into a reservoir below, and be preserved therein, together with the inorganic salts that may be carried through, or washed away, from the mould or earth by the said water; which water, with the inorganic salts contained therein, may be again supplied to the plant, to feed the same. He also claims the method, above described, of preventing the too rapid evaporation of the watery particles; and also the method, shewn in the drawings, of supporting the branches, leaves, or flowers, of plants.—[*Inrolled in the Petty Bag Office, February,* 1847.]

Specification drawn by Messrs. Newton and Son.

To William Carter Stafford Percy, *of Manchester, in the county of Lancaster, upholder, for certain improvements in the manufacture of bricks, tiles, chimney-tops, and other similar articles.*—[Sealed 2nd June, 1846.]

This invention consists, firstly, in a certain new and improved method of tempering or preparing the clay or other plastic material for use, whereby it is cleared of all stones or other hard substances; secondly, in a peculiar form of brick to be used for the prevention of damp walls, and for heating and ventilating purposes, applicable also to bell-hanging, gas-fitting, and communicating-pipes, flues, &c.; thirdly, in a new form of brick to be used for building bridges, viaducts, tunnels, chimneys, and towers, or in any other situation where strength, mutual support, and solidity are particularly required; fourthly, in a form of brick designed to be used for coping or covering the tops of walls and parapets, or the gable-ends of buildings, and in other situations; fifthly, in a grooved brick for receiving and retaining all kinds of plain or ornamental plaster or cement; sixthly, in a peculiar formation of tile for draining land; seventhly, in a machine for pressing and making bricks or tiles, or other similar articles; and, eighthly, in a peculiar construction of chimney-top for the prevention of downward draught in chimneys.

The improved method of tempering or preparing the clay or other plastic substance for the manufacture of bricks, tiles, chimney-tops, and other similar articles, is as follows:—The clay, having been procured in the usual manner, is to be mixed with water to a thick creamy consistency, and agitated in a "pug-mill," or otherwise, and afterwards strained or sieved, to separate all stones or other hard substances from it. The so prepared mass is then to remain stagnant in a suitable vessel, when the water will separate from the clay and rise to the surface; the clay or earthy matter remaining at the bottom. The water is then drawn off, and the clay is dried in the following manner:—The clamps or kilns, in which the bricks are burnt, are closed, and flues leading therefrom pass under the reservoir or vessel in which the clay is deposited; by this means, the heat of the kilns is caused to act on the

wet clay and accelerate the drying of the same. The patentee further proposes to make use of the heat evolved from the burning clamps or kilns for the purpose of drying bricks, previous to their being burned.

In Plate XIII., figs. 1, and 2, represent a plan and end view of the improved brick for heating and ventilating purposes: this is a "stretcher," or brick laid lengthwise in building. Figs. 3, and 4, represent a plan and side view of a "binder," or a brick laid cross-wise. These bricks have grooves or cavities *a, a,* formed in them, which, in building, must be left open or free from mortar; thus allowing a free circulation of air round every brick throughout the whole of any building formed of such bricks. The air for ventilation will have to be admitted by apertures opening into the passages *a, a,* at the bottom of the building, and emitted by a flue communicating with the passages at the top of the same. Fig. 5, shews the method of building the walls of houses with the new bricks; and figs. 6, shew some modifications of the above bricks, in which the course of the air passages is changed, for communicating with partition or outside walls, either single or double, or otherwise, and running at right angles. For heating purposes, heated air will have to be introduced into any of the said passages, and will thus circulate throughout the whole of the building. Fig. 7, is an end view of a stretcher-brick, for forming horizontal tubes for gas-fitting, bell-hanging, and other purposes; fig. 8, is a side view of a binder to be used with the same; and fig. 9, is a side view of a brick for forming vertical tubes, which may be used as a stretcher and binder alternately.

Fig. 10, is a face view of an improved form of brick, to be used for building bridges, and in other situations where great strength is required; and fig. 11, is a similar view of a modification of the same. It will be seen that these bricks are so formed that each shall abut or bear upon the one adjoining it; thus giving a peculiar firmness and solidity to the structure. Figs. 12, and 13, represent an obtuse-angled bridge, and a horizontal one built of the said bricks. The piers may be either built in the ordinary way, or formed of the improved brick, as shewn at *a, a,* in fig. 13. A modification of these

bricks suitable for culverts or arches, walls, &c., is shewn in face-view at fig. 14; and it will be evident that these bricks may be modified in their bearings from the perfect square to any bevil or angle: fig. 15, represents an ordinary doorway arch built of the said bricks. Figs. 16, and 17, are end and side views of an improved form of coping-brick, which has an overlapping bevil-joint *a*, for the purpose of preventing any water from lodging in the joint; and the top *b, b*, is hollowed or left square, and rounded to drain off the water: these bricks or tiles may be glazed when required to be impervious to water. Fig. 18, is a plan view of a grooved brick for building walls to receive plain or ornamental plaster work. The plaster in the operation of spreading is forced into the dove-tailed grooves *a, a, a*, and, when dry, is inseparable from the surface of the brick.

Figs. 19, and 20, represent, in plan and longitudinal section, the improved form of tile for draining land. When these tiles are placed below the surface of the soil, the water which drains through the soil in wet weather will pass into the chambers or reservoirs *a, a, a*, of the tile, and there remain; but when the weather is dry and warm, the water in the reservoirs *a, a, a*, of the tile will evaporate and moisten the soil above the tile; thus imparting in a great measure an uniformity of moisture to the soil in all weathers. The patentee, in concluding this part of his specification, states that he claims any and all of the above described forms or constructions of bricks or tiles, whether made of clay or other plastic material or composition, or applied to wood, stone, or any other material.

At figs. 21, and 22, an improved machine for pressing bricks or tiles is represented in two different positions; the brick being shewn at fig. 21, in the act of being pressed, and at fig. 22, as finished and ready to be removed from the press. Motion is communicated to the frame *a, a*, in such a manner as to cause it alternately to rise into the position shewn in fig. 22, and fall into the position shewn in fig. 21, sufficient power being given to compress the brick or tile, &c., to the requisite density. The frame *a, a*, slides in the side frames *b, b*, and carries the upper piston *c, c*, by which the brick is com-

pressed. This piston (as well as the lower piston *d, d,*) has a groove cut in its periphery to receive a packing of tow or other suitable absorbent material, well saturated with oil for lubricating the interior of the mould *e, e,* in which the brick or tile is pressed. A brick *f,* being placed upon the lower piston *d, d,* the frame *a,* carrying the upper piston *c,* begins to descend; the tension of the spiral spring *g,* keeping the piston *d,* stationary, until the lower part of the frame *a, a,* comes into contact with the slide *h,* fixed to the lower end of the piston-rod *d.* The two pistons will then travel downwards together until the lower end of the piston-rod *d,* strikes against the spring *i,* which stops its further progress; but the piston *c,* still descending, will compress the brick to the required solidity: the machine will then be in the position shewn at fig. 21. The two pistons *c,* and *d,* together with the brick *f,* will now ascend, until the slide *h,* reaches the top of the grooves *k, k,* when the spring *g,* will give way, and the piston *c,* will ascend alone. The sides of the mould *e, e,* being smooth, and well lubricated by the pistons, will impart a polished appearance to the sides of the brick. The spring *i,* is to be of sufficient strength to resist the force requisite to press the brick, but to give way, should too much clay be put into the mould; thus preventing the breaking of the machinery in such cases: or, if preferred, a weighted lever may be substituted. The thickness of the brick may be regulated by the screw on the upper end of the piston *c.*

The improved construction of chimney-top is shewn in section at fig. 23. *a, a,* are lips or projections to arrest the current of air; and, being curved upwards inside the chimney, the air, upon passing through the apertures *b, b,* will have an upward direction given to it, and, mingling with the smoke, will prevent any downward current in the chimney: the lower apertures *b, b,* are furnished with tubes *c, c,* inside the chimney, in order to direct the current of air upwards with more certainty; and *d, d,* are flanges, near the bottom, to carry off the water from the chimney.—[*Inrolled in the Petty Bag Office, December,* 1846.]

Specification drawn by Messrs. Newton and Son.

To George Frederick Muntz, *Esq., M.P., of Ley Hall, near Birmingham, for an improved manufacture of metal plates for sheathing the bottoms of ships or other vessels.*—[Sealed 15th October, 1846.]

This invention relates to the sheathing metal described in the specification of a patent granted to the present patentee October 22, 1832, which metal is composed of copper and zinc, in such proportions, that, whilst the copper is to a considerable extent preserved, sufficient oxidation is produced, by the action of the sea-water on the metal, to keep the ship's bottom clean; sixty parts of copper are used in this mixture to forty parts of zinc; and it has been found, that this proportion of copper could not be reduced without exposing the alloy to injury, from the zinc being separately acted on. The present improvements consist in combining a suitable metal or metals with the copper and zinc, so that the mixture may contain a less proportion of copper than that above named; and at the same time a sufficient degree of oxidation may be produced; and a separate action on the zinc prevented.

The patentee describes an alloy of copper and zinc with another metal, which he has found to possess the same properties of oxidation as the metal described in his former specification, and yet with an important reduction in the quantity of copper employed, and, consequently, in the cost of producing the metal. The alloy consists of fifty-six parts of copper, forty and three-quarters of zinc, and three and a quarter of lead; and, in making the alloy, the patentee uses an additional quantity of zinc, on account of the loss of that material which occurs during the operation, so as to obtain an alloy containing the different metals in the above proportions. The lead is said to act a very important part in the alloy, as, without it, the combination of fifty-six parts of copper with forty and three-quarters of zinc, would not produce an alloy which would oxidize sufficiently to keep the ship's bottom clean. The alloy, after being cast into ingots, is rolled into sheets (by preference, at a red heat), which are then to be annealed; and, if desired, the sheets may be cleaned with a mixture of sulphuric and nitric acids, properly diluted.

The patentee does not confine himself strictly to the above proportions, for the quantity of copper may be increased (which will, however, increase the cost of the sheathing metal), or it may be decreased to a slight extent; but it must not be reduced to fifty per cent. of the alloy produced. Although lead is mentioned in the above description, any other suitable metal may be used in place of it, but not with equal advantage.

The patentee claims the manufacture of sheathing metal, by so using other suitable metal or metals, when copper and zinc are combined for the purpose of sheathing, as to allow the mixture to contain a less proportion of copper than about sixty parts of copper and forty parts of zinc, and at the same time attain a sufficient degree of oxidation, and prevent separate action on the zinc.—[*Inrolled in the Inrolment Office, April,* 1847.]

To Thomas Lucas, *of Aldersgate-street, in the City of London, lozenge manufacturer, for certain improvements in the manufacture of lozenges or sweatmeats.*—[Sealed 29th July, 1846.]

This invention consists in preparing and using a combination of isinglass, gelatine, and sugar, for forming lozenges or sweetmeats, which may be colored, flavored, or medicated in any manner that may be preferred.

The patentee prefers to use what is commonly known as "book isinglass," because a solution may be more cheaply prepared than with any other description of isinglass. The book isinglass is first steeped in acidulated water, to render it more soluble, which is done by putting seven parts, by weight, of isinglass into a vessel, pouring in as much water as will be just sufficient to cover it, and then adding an acid thereto: the patentee prefers acetic acid, and he adds such a quantity of it to the water as will be equivalent to one part, by weight, of acetic acid of 1·04 sp. gr. to seven parts, by weight, of water. The isinglass remains in the acidulated water for four days, and then the water is poured off,—this

water may be used for soaking a fresh quantity of isinglass, after a sufficient quantity of acid has been added to supply the place of that which has been imbibed by the isinglass. The isinglass is now repeatedly washed in water, to free it from the acid; to accomplish which object the water is changed three times per day for three or four days (care being taken, each time that the water is changed, to press as much water out of the isinglass as possible); and the washing is continued until the water is found to be perfectly free from acid, on testing it with the ordinary test paper. When the washing is finished, the isinglass is put into a copper pan, with as much water as will be sufficient to dissolve it, and it is boiled by the introduction of a jet or jets of steam into the water, until the whole, or as much as possible, of the soluble portions are dissolved, which will be effected in about six hours; after this, the contents of the vessel are left to settle for about an hour, and then the solution is drawn off into another vessel.

If the isinglass should be of a better quality than book isinglass, the time occupied in steeping it in acidulated water may be shortened, or that process altogether omitted, according to its quality; that process being unnecessary if the best isinglass be used; and such isinglass may be at once dissolved, by boiling, without any previous preparation.

The solution of isinglass, obtained by either of the above methods, is boiled, by means of steam, until the whole or nearly the whole of the opaque or undissolved particles which remain in it rise to the surface; these are skimmed therefrom, and the solution is filtered.

To a solution made of seven parts, by weight, of book isinglass, as above described, the patentee adds twenty-four parts, by weight, of gelatine, and as much sugar as will make the intended lozenges or sweetmeats agreeable to the palate; these materials are subjected to a heat of 140° Fahr., in a steam-pan or other vessel, and are well stirred, until the gelatine and sugar become dissolved. When the solution has been made of seven parts, by weight, of isinglass of a better quality than book isinglass, this will form a stronger solution,

or a larger quantity of solution, and consequently more gelatine and sugar must be added. The compound solution of isinglass, gelatine, and sugar is intended to form the basis of lozenges or sweetmeats, the quality or flavour of which may be varied, by increasing or diminishing the proportion of sugar, and by adding tartaric acid, medicines, or coloring or flavouring matters to the solution, when in the steam-pan; the solution is then allowed to cool in the pan for about half an hour, so that the air-bubbles and scum (if any) may rise to the surface; after these have been skimmed off, the solution is put into tins; and, when cold, the sheets or pieces are placed upon net trays, and dried in a chamber, heated to 84° Fahr. The drying process will occupy three or four days; and the pieces are then cut into lozenges or sweetmeats of the desired shape, which are to be placed on cloth trays and kept in a chamber, heated to 84° Fahr., until they are sufficiently dried to prevent them from spoiling: this will generally be effected in two or three days; after which time the lozenges or sweetmeats may be put into boxes for sale.

The patentee claims the combination of isinglass, gelatine, and sugar, as above described, for the purpose of manufacturing lozenges and sweetmeats.—[*Inrolled in the Inrolment Office, January,* 1847.]

To Joseph George, *of Chelsea, in the county of Middlesex, coal and mine master, for improvements in the construction of houses, buildings, and other erections.*—[Sealed 22nd June, 1846.]

This invention consists in constructing buildings and other erections in such a manner, and of such materials, that, when the materials are prepared, the buildings may be expeditiously erected, be perfectly fire-proof, and cost less than houses built in the ordinary manner. The materials which the patentee employs may be prepared (ready for putting together) at a distance from the locality where they are ultimately to be erected; and, from this circumstance, the houses constructed according to this plan will be suitable for exportation.

The skeleton or frame-work of the building is constructed of iron bars, which are furnished with longitudinal grooves for receiving slabs of slate, stone, or other material, of suitable quality and thickness, which are secured therein, and form the sides or walls of the building. When a sufficient number of slabs of slate or stone are built up in the grooves of the iron framing to the height required to form one room, floor, or suite of rooms, of proper and suitable dimensions, the top edges of the slabs are protected or covered by horizontal sills of iron, which are made to support the flooring-joists for a second set of rooms above the first: these flooring-joists being also of iron, and dovetailed in the iron sills above mentioned, form ties to bind the several parts of the building together, and keep the sides of the house firm and secure and in a vertical position. The flooring is also composed of slabs of slate or stone, laid upon the horizontal bars, and cemented together in any convenient manner. Light wooden joists may be used, if thought desirable, for the purpose of supporting a lath and plaster ceiling; but in order to form an efficient protection from fire, iron joists and fire-proof slabs of slate, stone, or other suitable material should always be employed in addition to the wooden joists. The chimneys may also be constructed of slabs of slate or stone, jointed together, and the joints made perfectly air-tight, in order to prevent smoke issuing therefrom into the room. The roof is formed of diagonal or sloping-bars or rafters; these sloping-bars or rafters are supported at their upper end by a longitudinal ridge beam, and at the lower end they abut against the iron sill-pieces which cover the top edge of the walls. The rafters are furnished with grooves or flanges at their sides, for the purpose of supporting the roof-slabs, which may be made of much thinner material than the slabs which form the sides of the house: the ends of the roof-slabs must of course be made to overlap each other, and be secured by cement so as to form a perfectly water-tight joint.

In Plate XI., different views of a building, constructed according to this invention, are shewn, and also views of various detached parts of which the same is composed. The building or erection is raised upon a foundation-plate con-

structed of cast-iron, but wrought-iron may be used, if preferred; and if the building is to be of large dimensions this plate must be composed of various parts, which should be firmly bolted and secured together; and before the foundation-plate is permanently fixed, the earth underneath should be consolidated and made level, so as to present a compact hard and even substratum, not likely to yield to the superincumbent weight which will be subsequently placed thereon. In the foundation-plate, at proper and convenient distances apart, square holes or sockets are made for the purpose of receiving the lower ends of the wrought-iron uprights, which form the skeleton-framing. Fig. 1, represents an end elevation of a house, constructed upon the improved plan; fig. 2, a transverse vertical section; fig. 3, is a horizontal section, or plan view, shewing the wrought-iron flooring-joists in their places (the slabs which form the flooring being removed); and fig. 4, is a longitudinal vertical section, taken through the middle of the building.

A, A, is the foundation-plate, which having been firmly bedded upon a compact and solid substratum of earth, the corner uprights *a, a,* and intermediate uprights *b, b,* (shewn detached at figs. 5,) are first placed and secured in their sockets in the plate, and, if required, are held by extraneous and temporary means in a vertical position, until some of the tie-rods are permanently placed, which cannot be done until a portion of the slabs, intended to form the side and end walls, are secured in their proper places.

The iron uprights *a, a,* and *b, b,* being secured in their sockets, the slabs of slate or stone *c, c, c, c,* are then successively slidden into the grooves of the uprights, their lower edges resting upon and being supported by the foundation-plate A; and when a sufficient number of slabs have been built up on one another, to a height suitable for one set of rooms, their top edges are covered by sills *d, d,* made of wrought or cast-iron, in which are made dovetailed grooves or sockets, to receive the ends of the flooring-joists *e, e, e,* which are thereby also made to act as ties, to bind the ends of the structure together. The sides of the house are represented in the figures as bound together by the cross-ties *f, f,*

which are dovetailed into the sills *d, d,* and by passing under the flooring-joists *e, e,* in some measure help to support them. The lower floor is also furnished with flooring-joists, arranged precisely in the manner already described, and the flooring is formed of slabs of slate or stone, if the building is intended to be fire-proof. The patentee remarks, that in place of employing the sills *d, d,* in separate lengths, he sometimes makes one length to extend from end to end of the building, by passing it through holes made in the uprights *b, b;* and by so doing, the uprights are made to relieve the lower slabs of the walls of a great portion of the superincumbent weight.

The lower floor or suite of rooms being thus completed, and the flooring of the rooms above being laid, a second series of slabs of slate or stone are built up in the grooves of the uprights *a, a,* and *b, b,* on the top of the sills *d, d,* so as to form the walls of a second set of chambers above the first; and when the walls are built up of a proper height, the top edges of the slabs are covered with a second set of sills *d, d,* similar to the first, and furnished with dovetailed sockets, to receive the ends of another set of joists, which (if the space above is not intended to be used as chambers) need not be so strong as the former ones, but must be of sufficient strength to act as tie-rods, and also support the ceiling of the rooms below. The roof is supported in the centre by a longitudinal ridge-beam *g, g,* which runs from end to end of the erection, and supports the upper end of the roof-rafters *h, h,* the lower ends of which abut against the sills *d, d,* which are however prevented by the ties *f, f,* from yielding to this strain. Thin slabs of slate are laid on the rafters, and their end-joints are made to lap over one another, as shewn in the detached enlarged sectional views, fig. 6, for the purpose of forming a water-tight joint, when secured by cement. The slabs are prevented from slipping off the rafters by a projecting piece or hook, against which they rest at the lower end of the rafters; and the sides of the slabs are secured by a cap-piece, attached to the vertical flange of the rafter, by bolting or otherwise, whereby they are effectually prevented from being raised up or displaced by wind or otherwise.

A ridge or cap-piece *i, i,* made of iron, zinc, slate, or other

suitable material, is applied to the top joints of the roof-slabs, to keep them water-tight. If the house is intended to be fireproof, the windows and doors should be hung in iron frames. At fig. 1, this mode of adapting the windows and doors to a fireproof house is shewn: c^1, is a narrow slab of slate or stone, placed in the grooves of the uprights, and surmounted by an iron sill-piece d^1. The framing *k*, *k*, of the windows is made of cast or wrought iron, and rests upon the sill-piece d^1; and the space between the iron framing and the uprights is filled by narrow upright slabs c^2, c^2, of the same height as the iron window framing, which, as well as the side slabs c^2, c^2, is secured in its place by a top sill or cap-piece d^2, made of iron; and on this sill-piece, a second slab of slate, stone, or other material, is placed, and surmounted by the sill-piece *d*, in the dove-tailed sockets of which the joists of the floor above are secured. The door is constructed and secured in its place in a similar manner; it will not, therefore, be necessary to give any further description of it, as the mode of adapting it to this system of building will, by the foregoing explanation of the windows, be found amply sufficient.

In the drawings, the chimneys are represented as constructed of slabs of slate, held together by screw-bolts *j*, *j*; but he does not confine himself to this mode of constructing them, as circular, oval, or other conveniently-shaped pipes, made of earthenware or other suitable material may be employed; or the chimneys may, if thought desirable, be built of brick in the ordinary manner. In addition to the iron joists, rafters, and uprights, above mentioned, other light ones, of wood, may also be employed, for the purpose of holding a lath and plaster covering for the walls and ceilings, if required; and the uprights *a*, *a*, and *b*, *b*, and the sills *d*, *d*, which are visible externally, may be covered over either with slate, stone, metal, or plaster, worked into any ornamental device, such as pilasters, or other suitable ornament, so as to hide such parts from view, and add to the architectural beauty of the building.

The patentee claims constructing houses, buildings, or other erections of slabs of slate, stone, or other suitable ma-

terials, which are capable, to a great extent, of resisting the action of fire; such slabs of slate, stone, or other materials, being supported and held together by a framework of iron or other metal, in the manner or upon the principle herein set forth.—[*Inrolled in the Petty Bag Office, December*, 1846.]

Specification drawn by Messrs. Newton and Son.

To James Lysander Hale, *of Hackney, in the county of Middlesex, civil engineer, for certain improvements in sewerage and drainage, and apparatus connected therewith; parts of which are applicable to steam-engines.*—[Sealed 22nd October, 1846.]

The first part of this invention is designed to prevent the escape of foul or noxious air, gases, and vapours from drains, engines, pipes, and other apparatus; to obviate the effects resulting from the corrosion of the iron or other metal of which valves and their hinges and beds are made; and to ensure the free and perfect action of the valves.

In carrying out this part of the invention, the patentee uses an instrument of the same shape as the common iron sewer-trap; but instead of the pipe part of the trap being made of iron, it is formed of brown stone ware, glass, or any other material that will not corrode; and in place of the valve or flap being made of iron and connected to the pipe by iron or other metal hinges, a valve or flap of vulcanized India-rubber, gutta-percha, or other substance, either simple or compound, that is flexible and durable, is used, and is attached to the pipe by a hinge of vulcanized India-rubber or other flexible and durable material. The flexible hinge is applied in a similar manner to the ordinary hinge, and the patentee prefers to connect it to the valve and pipe by an adhesive solution, prepared by the Kamptulicon Company, and termed "elastic cement;" but it may be fastened by rivets or other suitable means. A piece of flexible material, of the same kind as that used for the hinge, may be fixed on that part of the flange of the pipe which forms the bed whereon the valve rests. The flexible hinge may be used in all situations where moisture, damp, or vapours corrode metallic or rigid hinges, or otherwise impede the free action of such hinges.

Another kind of valve, for effecting the above object, is formed of a sheet of flexible material, such as vulcanized India-rubber, about one-eighth of an inch thick; and on one side of it a metal plate, or stone slab, or metal ribs, is or are fixed, to press the flexible sheet on to its bed, and make the joint air-tight. The ribs are preferred, as they possess the following advantage over the metal plate:—Supposing the valve to be covered with eight ribs, each two inches wide, then, if the water that is flowing out of the pipe is two inches deep, it will raise the lower rib on the valve, and no more, while the other ribs, pressing the portion of the valve which is beneath them on to its bed, render the valve air-tight during the egress of the water.

A third description of valve is formed by dividing a circular plate of galvanized iron, by a straight cut, into two unequal parts, and connecting them by a band of India-rubber or other flexible and durable material, which acts as a hinge; the smaller portion of the plate is fixed to the end of the pipe, and the other part moves freely on the hinge.

A fourth mode of carrying out this part of the invention consists in fixing to the end of the pipe which is to be trapped a curved metal plate, with a hole in the centre corresponding to the bore of the pipe, and covering this hole with a diaphragm of any flexible and durable material, rivetted nearly all round; the portion left unfastened being of such size, that when the valve or diaphragm is open there will be the same space for the egress of the water as is contained in the cross section of the pipe. In some cases the diaphragm is covered with a curved metal plate, to protect it from injury. This valve effectually prevents the escape of foul air during the egress of the water; and it will be found particularly useful in situations where pipes are required to be kept clear during the rising of tidal or other waters.

The object of the second part of this invention is to promote the free circulation of atmospheric air, by withdrawing from it noxious gases and vapours arising from drains, engines, pipes, and other apparatus, and giving such gases and vapours a direction and current; and it is also applicable to the draining and drying of houses, foundations, walls, and every description of buildings.

In carrying out this part of the invention, the patentee takes a sheet of metal, and cuts out of it a series of straight strips at one end, or at each side for some distance from one end; he then forms the sheet into a cylinder, by bending it and fastening the edges together; after which, he covers the cylinder with a circular plate of metal, of such size that its edge will not project beyond the external surface of the cylinder; and the upper portion of the cylinder he then surrounds with a plain metal cylinder, of much larger diameter than the first-named cylinder. The instrument, thus made, consists of a cylinder or tube, covered in at the top, and having towards the upper part of its periphery a series of equidistant vertical openings, or a series of equidistant annular openings; this cylinder or tube is surrounded by a second cylinder (the upper edge of which is level with the cover of the first, and its lower edge is a short distance below the openings), forming a shield to the inner and closed cylinder; and being open at both ends, the gases and vapours discharged through the vertical or annular openings, into the space between the two cylinders, can readily escape. If preferred, the instrument, instead of having a cylindrical form, may be made of any other suitable figure. The patentee states, that he generally applies this invention to the outside of the building; that it creates a great draft, and by this means, drains away all moisture, damp air, &c. He dries damp walls and apartments, by putting the instrument on the top of chimneys connected with them. He states, that the instrument will be found effectual for preventing smoky chimneys, and for ventilating churches and other buildings.

Another improvement, forming part of this invention, consists in manufacturing sewer and drain gratings of brown stone-ware, instead of using iron or common stone, as usual. Gratings so made may be substituted for the small iron gratings which are fixed in the face of walls, to produce a free circulation of air for drying purposes; and, when so employed, the patentee terms them "air-bricks."

The parts of this invention which are applicable to steam-engines are the valves above described, and they may be used in precisely the same manner as the ordinary valves.—[*Inrolled in the Inrolment Office, April,* 1847.]

Scientific Notices.

On the Principles relating to the Specification of a Patent for Invention.—By W. Spence. Stevens & Norton, Fleet Street.

From the redundant essays at enlightenment, which, through the agency of the press, that school of economists who would make "every man his own lawyer," &c., have of late deluged the reading public, we are well nigh driven to embrace the tenets of confirmed egotism; and it is therefore no little advantage to meet with an antidote in the shape of a rational and well-digested work, which shall present to our deluded minds the unpalatable truth, that what others have grasped by earnest and unremitted application, must, if coveted, be attained by ourselves in the same methodical way. It may not have occurred to many, although on a little consideration the truth of the proposition will be evident to all, that for the value of the property involved, the specification of a patent for invention is of all legal documents the most important, inasmuch as it is virtually the quit rent and the title deed of the inventor's rights; for, in the first place, the clause in the patent, enforcing as it does the proper setting forth of the invention, so that the public may come to a clear and certain knowledge of the effected improvement, renders patent property null and void, without the fulfilment of the imposed obligation;—and, secondly, unless the specification sets out clearly the subject matter of the invention, there is nothing whereby the inventor's rights can be determined,—the line of demarcation of his property is wanting. Such then being the case, it were needless to enforce the employment of the utmost care and consideration in the preparation of the document, which involves not merely the claim to, but the existence of, the property to which it relates; no equity court of appeal being open to the patentee to retrieve what he has lost by not conforming to the proviso in the original grant.

In the early stages of inventive development a specification was not required on granting a patent, but the grantee was in general bound to instruct persons how to pursue and carry out the new manufacture. This was at the time a sufficient guarantee that the public should have the advantage of the discovery when the term of the patent expired, and was in fact the only way in which the invention could have been made generally available.—But as improvements in the various branches of manufacture progressed, and people became only too eager to seize upon the facilities which they found their neighbours to possess, the prospective advantage accruing to the public was found not to be the only interest requiring protection;—the right which the inventor had

heretofore enjoyed, from want of competition, was now, for the first time, threatened with invasion. It became therefore a matter of necessity that an inventor, when soliciting the protection of the crown, should consent to deposit a description of his invention as soon as he had completed the details of his machinery or process,—and this, not merely to check the eager hunt on other men's manors, but to shew distinctly what knowledge the ingenious might avail themselves of in perfecting other plans of operation.

The mode at first adopted by inventors to describe their *advance* in operative science, was very general, and might be looked upon more as an index to the manufacture to which the improvement referred, than as a detailed account of the invention itself. When therefore inventive genius became diffused, and the increased amount of manufactured articles rendered each succeeding invention (however trifling, if taken abstractedly) of considerable value, it followed that a more minute division of rights would be required; as new *principles* could not be expected so frequently to arise, and therefore their application in different modified ways was henceforth to be the prevailing subject for patented inventions.

It was from the period when what we may term the "giant strides in ingenuity" ceased to be frequent,—frequent, that is, in comparison with the few inventions of any kind then brought forward,—and the outline, thus obtained, remained to be filled in, (the crudities requiring removal by successful re-arrangements of parts, and economy of working, being as yet but partially attempted) that the specifications of patents were found to be vague, and in most cases wholly unintelligible, except to those initiated in that branch of the arts which the invention was intended to improve. The effect produced by such crude descriptions can readily be conceived. In order to decide with some shew of justice upon cases involving the validity of patents, the judges, after listening with becoming patience to jargon which they were unable to comprehend, and attempting to fathom the inexplicable arguments of counsel, lost in labyrinths of their own creating, determined most generally to strike at the semblance of monoply, and by that means broke the knot of difficulties, and crushed the hopes of sanguine inventors. This was a period in the history of patents which may be called the "dark age," and extended from the latter part of the last century to within thirty years of the present time. Whether the establishment of this Journal led to the adoption of a more intelligible method of describing mechanical and other improvements, we shall not stop to enquire; but it is from about the time when the specification began to be considered the vital part of the patent, and therefore received a better share of attention in its preparation, that we may date the steady growth of the more lenient decisions on patents under investigation in our law courts; whereby, without any material change in the laws themselves, patents were placed on a satisfac-

tory basis, and were rendered as secure as any other species of copyright property.

If we seek for the explanation of the apparent anomaly, that the rights of inventors are, while the world is inundated with inventions, better understood than when their birth was rare, the explanation must be found in the fact, that the specifications which patentees were formerly necessitated to prepare themselves, are now for the most part drawn by persons who have, or are presumed to have, qualified themselves for such an office. The patentee of the present day does not, therefore, stand in the disadvantageous position of his predecessors; but, if unwilling to risk the validity of his invention on his own unaided attempts at the preparation of the specification, he has yet a duty to perform, which is, to choose a fitting person on whom to rely; and for this purpose, he must be possessed of a certain knowledge of the matter in question whereby to direct his choice judiciously. To attain this knowledge, without the personal sacrifice of dear-bought experience, it is necessary to examine the recorded decisions of the Court, on the valid and imperfect specifications of patents which have been contested; and, as a lucid commentary on such cases, we have much pleasure in directing attention to Mr. Spence's work, which has suggested the above remarks; and which, according to his preface, is intended "to point out to patentees the kind of standard by which the sufficiency of this important instrument (the specification) is tried, with a view of shewing to them how much their own interests depend on its due preparation."

Our author first treats of the validity of the patent, with respect to prior public use of the invention—its publication in a printed book, and its publication in a specification of a prior date. This portion of the work might be considered as independent of the specification, and involving only the validity of the patent, upon the ground of want of novelty; but as the proper treatment of the specification would, in the majority of cases, save something of the invention, if the patentee *were* anticipated, we cannot take an exception to this section of the work, which "simply proposes to illustrate certain operative as distinguished from abstract principles, which enter into the consideration of the general question relating to the specification." Before proceeding to explain the proper order or construction of the specification, the author makes some just remarks on "good faith," taking for his text the words of the late Lord Eldon: "The specification may be said to be the consideration for the bargain between the public and the patentee, and must be judged on the principle of good faith." We cannot but approve of the whole of this chapter; but if the inventor has not the shrewdness to see his advantage in acting honestly by the public and by other inventors, we question whether the arguments here adduced will have the effect of bringing him to the path of rectitude;—

the pruning knife must cut deep before this unsoundness is eradicated.

The order of the specification, the language of the specification, and the drawings to illustrate the description, are described in detail with great care and discretion; but from the stress which has been laid upon the order or construction, and the examples which have been chosen, it might be inferred, that such order was essential, whereas, it must really be considered as convenient: in some cases, the experienced specification-writer would find it positively injurious. The following extract will give concisely the author's *beau ideal* of a specification, and is, in fact, the arrangement which is generally approved of; but from the varied nature of inventions, it follows, that different lines of treatment must be occasionally resorted to. It occurs in a recapitulating chapter, and runs thus:—

"First,—As to the necessity of keeping the parts well together. The primary idea in connection with the accurate development of an invention, is its object or purpose—what is meant to be accomplished by it. No right view of an invention can be taken, without its object be known clearly and fully. It is likewise important to observe, that the legal character of the patented invention, as described in the specification, is to be inferred from a knowledge of the professed object, rather than the object from the rest of the description. When, however, what is meant to be accomplished is thoroughly known, then arises the enquiry—by what means? which enquiry calls for the statement of the essential character of the invention; and the statement points out, in brief, the mode of operation to be adopted, in order to produce the new manufacture. But such statement has to be followed into practical detail, in order to ascertain whether the principle thus enunciated be really capable of answering the purpose assigned to it; accordingly, the detailed description of the machine or process (with or without drawings, as the case may be) supplies the means of testing the practicability of such principle, by setting forth the exact mode by which it may be realized or carried into effect. And then, lastly, to avoid the danger of confinement to such detail, or perhaps of failure in conveying an indubitable apprehension of any distinct substantive feature, the claim is required, in order to render the spirit of the invention evident,—that its precise scope may be clearly seen. This being the order of thought, suggested on the contemplation of a patentable invention, it is manifest that the parts should be kept well together, in order to secure the same harmony in the actual arrangement of the matter in the specification.

"Secondly,—The parts of the specification should be adapted to one another, so as to produce an uniform structure, adequately sustained. The province of the specification is something more than merely to exhibit a collection of matter, arranged under the

foregoing plan: it is to present the invention resting on the title of the patent, as a building rests on its foundation.

"In this view, it is requisite to bear in mind that the broadest ideas which have to be stated, would be treated as fundamental; and not only so, but the bond of connection between them and the title should be strongly laid. For instance, the object of the invention is the fundamental idea; hence, its scope must be within the breadth of the title; but it must also be really a practical object, having value in its application to the subject of the title, or the sufficient adaptation and connection would be wanting. Again, the essence of the invention not only follows in order, but is within the breadth of the object; and its suitable adaptation thereto, and connection therewith, depend upon the practical reasons which exist in corroboration of the terms used to characterize such essence in its application to the object. And a similar remark may be made on the description of the detail in its relation to the essence of the invention. Then, finally: as regards the claim, it seems to be different. That is not exactly an integral portion of the structure in the sense in which the former parts have been so considered. To pursue the analogy of a building, they may be said to constitute separate floors; the claim on the other hand is not so, but rather the mode of connection and adaptation which runs through the whole fabric or structure, and which secures its stability. This idea, when applied to the specification, represents the inherent principle which renders the invention described a real addition to the public stock of information; it is, indeed, the all-pervading principle."

We must conclude our notice of Mr. Spencer's work with an extract, the truth of which cannot be too strongly urged on those who would wish to reap an advantage from the supposed invalidity of patents, encumbered with claims of apparently too sweeping a nature:—

"The claim, rightly understood, is, in fact, the specification; but then, in order that it may be rightly understood, reference must be had to the antecedent matter; and it may indeed be said, that the intelligibility of the whole specification greatly depends upon the particular interpretation of the claim, which is suggested by such reference."

OBSERVATIONS ON THE CULTIVATION AND PREPARATION OF MADDER, MADE DURING A RESIDENCE IN ZEALAND.

BY M. DECAISNE.

[Translated for the London Journal of Arts.]

The author, having formerly studied the structure of madder, and the development in the plant of its coloring-matter, followed, with interest, the progress of its cultivation since the publication

of his work, to which he considered many of the alterations, both in its treatment and the estimation in which it is held, are mainly attributable; as the first cultivation of, and traffic in, this substance in Zealand took place the year following the publication of that work. This supposition is strengthened by the ordinances of the Dutch Government, relative to the cultivation of madder, the marks to be put upon fabrics dyed therewith, and the nomination of assayers, &c. The cultivation and manufacture of madder in Zealand was, therefore, doubly interesting to the author; and it was important to examine the processes employed in Holland, in comparison with those followed in Avignon.

The three islands of Zealand, which he visited, were Schouwen, Walcheren, and Zuidbeveland; in the former and latter of these he found the madder cultivated to the greatest perfection: the ground is extremely calcareous, and has the same chemical constituents and characteristics as the earth in which red madder is cultivated at Avignon. The upper strata of the soil of Zuidbeveland are nearly identical with those of Holland, properly so called (*Elie de Beaumont, Leçons de Geologie Pratique*, p. 262). The stratum of peat or turf, called *marine turf*, upon which the madder-earth lies, in the plain known as Wilhelmina, is formed by the aid of fresh water, as is proved by the fossil remains. The cultivation of madder, long neglected in Zealand, has received a new impulse on the part of the Government since 1837; and the manufacturing cultivators anticipate, that this product will soon regain the favor with the public it had some centuries back. The author had the satisfaction of perceiving, that the new processes, both of cultivation and manufacture, were carried on precisely according to the instructions contained in his memoir, wherein he shewed that the quality of the root, and the richness of the coloring-matter, augment with the age of the plant. To obtain this augment, the cultivators in Zealand, when it is possible, only take up the plant every three instead of every two years.

It had been observed by the author, that the cortical parenchyma, which contains the immediate principle, is much increased in size when grown under ground; this led him to advise that the plant be covered with earth, as the best means of developing the coloring principle; and this operation, which was formerly neglected, is now constantly put in practice by cultivators of madder. He believes the fact to be established, that climate has no influence on the coloring properties of madder. The Zealand madder, cultivated in calcareous soil, will bear comparison with that of Avignon in the markets of the principal cities of Europe and America; it does not require the addition of carbonate of lime in the dye-bath, but produces fast colors alone. If it were objected, that all the Zealand madder does not possess the qualities just mentioned, it might be answered, that the exceptions, if any exist, are owing to the chemical composition of the earth;

in fact, some earth, as remarked by M. Elie de Beaumont, contains 75 per cent. of silica, and, consequently, does not contain the calcareous element required by the madder.

Lastly, from the author's observations on the influence of solar light and damp air upon madder powder, the Zealand manufacturers have understood the necessity for pulverizing the roots in places lighted and heated by artificial means, and now invariably perform that operation under such conditions.—[*Comptes Rendus.*]

ON AN IMPROVED MODE OF WORKING STEAM-ENGINES.

BY M. COMBES.

It is well known to engineers, that the space between the piston of a steam-engine at the end of its stroke, and the end of the cylinder, is prejudicial to the working of the engine, by reason of the steam which lodges therein before the *initial* pressure has been wholly expended upon the piston; it also facilitates the entrance of water with the induction steam. This latter evil, which is technically termed "priming," is partially remedied by so arranging the slide-valves that the communication with the condenser may be cut off before the end of the stroke; the unnecessary, or rather injurious space, is then filled with steam, denser than that in the condenser. In order entirely to destroy its influence in single-cylinder engines, two conditions would be necessary, viz., 1st,—the pressure of the steam should be equal to that in the condenser; and 2nd,—the communication with the condenser should be cut off at the moment when the space which the piston has yet to traverse is in the same proportion to the prejudicial space before mentioned, as the initial pressure is to the pressure in the condenser. In an engine working at a pressure of three atmospheres, the pressure in the condenser being $\frac{2}{10}$ of the atmosphere, and the injurious space being equal to $\frac{1}{20}$ of the space traversed by the piston, the steam in the cylinder should be allowed to expand to $\frac{2}{10}$ of the atmosphere; for which purpose, the steam should only be admitted during $\frac{1}{50}$ part of the stroke; and the communication should be cut off as soon as the piston has run through $\frac{2}{10}$ of its course. It is practically impossible to comply with these conditions, or even to approximate to them when using a single-cylinder condensing engine. The case is, however, different with single-action engines; for in these, the space containing the motive steam is never in direct communication with the condenser, it being separated therefrom by the piston and by the equilibrium valve. During the return-stroke of the piston the cylinder is not in communication with the condenser, and it would be sufficient to shut the equilibrium valve at a certain portion of the stroke (which is easily determined), in order to compress the steam in the injurious space to

the initial pressure: for instance, in a single-action engine, in which the space between the piston at its completed stroke and the end of the cylinder would be $\frac{1}{30}$ of the space run through by the piston, and the capacity of the equilibrium valve-pipe $\frac{1}{18}$ of that of the cylinder, the initial pressure of the steam being three atmospheres, and being allowed to expand to half an atmosphere, the equilibrium valve must be shut when the piston has made 0.73 of its stroke: the steam would therefore be admitted during one-eighth of the stroke.

It is evident, that if two single-action engines were coupled together, so as to act upon a shaft in the same way as a double-action engine, and were regulated by a fly-wheel, by shutting the equilibrium valves at a certain portion of the return-stroke of the pistons, as above mentioned, the influence of the injurious space in each cylinder will be entirely done away with; as steam at the initial pressure will occupy such space on the opening of the induction valve, and only that quantity of steam which is introduced into the cylinders at each stroke would be condensed.—The resistance produced by the compression of the steam at the end of the return-stroke would be neutralized by the expansion of that steam in the following stroke. In single-action Cornish engines, not coupled, the steam is also compressed at the end of the return-stroke of the piston by the weight of the pump-rods; but the pressure of that steam which merely acts to counterbalance the weight of those rods, is necessarily less than the initial pressure; and therefore the injurious effects occasioned by the space above mentioned is only partially done away with.

I have endeavoured to apply the principle of compression of the steam in the injurious space to the double-cylinder engines, commonly called Woolf's engines, which are now again coming into use, and would never have been abandoned if the details of their construction had been properly studied. In order to neutralize the influence of the injurious space in the small cylinder, it will only be necessary to cut off the communication between the opposite ends of the small and large cylinders, when the former contains a quantity of steam sufficient to fill that space at the initial pressure. The position of the piston when this communication is cut off, will depend in each case on the size of the injurious space, and the portion of the stroke during which the induction aperture was open. The passage of the steam being thus cut off at the required time, there will be no other loss occasioned by the injurious space than that which results from the expansion of the steam when the opposite ends of the two cylinders are put in communication with each other at each stroke of the piston; and this loss may be diminished by filling the steam-pipes with steam at a pressure higher than that which acts on the working-piston at the end of the stroke.

The drawings accompanying the memoir, shew the general arrangement of the valves in a double-cylinder engine, of from

twenty to thirty-horse power, constructed by M. Farcot, according to the improved plan.

The exit of the steam from the small cylinder may be stopped by adapting three pistons to one rod in a vertical cylinder. These pistons are displaced at convenient times by tappets on a rod, and these tappets may be adjusted to suit the working of the engine. At each end of the large cylinder two double-seated valves are adapted; the one for the entrance of the steam is placed at the extremity of the pipe leading from the cylinder; the other for the exit is placed at the extremity of a large pipe leading to the condenser.

According to the dimensions of this engine, the passage of the steam from the small into the large cylinder must be intercepted when $\frac{8}{10}$ of the stroke have been performed, if the steam is admitted into the small cylinder during the whole of the stroke; $\frac{6}{10}$ if the steam is admitted during half the stroke; and $\frac{4}{10}$ if steam is admitted during one-quarter of the stroke.

It is also advisable to shut the induction valve into the large cylinder after the passage of the steam is cut off, in order that the communicating pipe may be full of steam at a pressure superior to the final pressure; and that the loss owing to the expansion of the steam on putting the opposite ends of the two cylinders in communication, may be as small as possible. For an initial pressure of three atmospheres, a pressure in the condenser of $\frac{1}{10}$ corresponding to a temperature of 46° centigrades, and admission of steam during a quarter of the stroke of the small piston, a calculation would give the advantage rusulting from the new arrangement, of an increase of power over the ordinary plan equal to 5·8 per cent.

The advantages of the improved plan increase with the extent of expansion, and with the relation of the initial pressure of the steam admitted to that in the condenser.

The economy effected appears to be greater than calculation would seem to imply, on account of the favorable circumstances resulting from the existence of compressed steam between the piston and the end of the cylinder at the moment of opening the induction valve.

In the note presented by me to the Academy, I have shewn that by a certain arrangement of Woolfe's double-cylinder engines, as proposed in my memoir, the steam passages may be enlarged without diminishing the power produced by the initial pressure of the steam; and also without losing much of the power produced by the expansion of the steam on first acting upon the pistons from the communication pipe between the two cylinders. The advantage of enlarging these passages is well known, as it will diminish the counter pressure upon the small piston.

I chose, for experiment, an engine in which the capacity of the small cylinder and of the pipe which serves for the entrance of the steam into that cylinder, and for its passage into the other cylinder, would be equal to $\frac{1}{15}$ of the small cylinder, or $\frac{1}{32}$ of the large cylinder: the capacity of the remainder of the communicating pipe would be equal to about $\frac{1}{38}$ of the large cylinder; the pressure in the condenser, or rather behind the large piston, would be $\frac{1}{36}$ of the initial pressure. The comparative tables of the extent of power calculated relatively to a certain expenditure of steam in an engine constructed on the ordinary plan, and another on the improved plan, give an advantage of 13·6 per cent. in favor of the latter, where the steam expands to eighteen times its original bulk; and the advantage is 6·2 per cent., when the steam is admitted into the small cylinder during the whole of the stroke, and only expands to three and a half times its original bulk, before entering the condenser.—*Ibid.*

THE CHEMICAL PRINCIPLES OF THE ROTATION OF CROPS, BEING A MEMOIR READ BEFORE THE AMERICAN AGRICULTURAL ASSOCIATION:—BY D. P. GARDNER, M. D.

THE Essay with the above title has been published in the transactions of the American Agricultural Association, of which it occupies seventeen quarto pages. The subject is treated in a scientific, though very lucid manner, the main object being to point out and establish principles without dealing in nice details. Dr. Gardner has succeeded in condensing a very great amount of useful information in a small compass. He sets out with explaining the objects and necessity of rotation, and gives the views that have recently prevailed in relation to what is termed a natural rotation. Upon this last subject he says:—

"The natural succession of plants is connected with the presence of organic matter in the soil. The richest weeds which first occupy the surface having the greatest necessity for it, and thus, through successive groups, to the grasses and forest trees, which grow well without any portion in the soil. Other elements of fertility being present, the *chenopodiaceous* and allied families thrive only in such localities as yield azotized matters, since they cannot grow without a supply from the soil. This surmise is not only sanctioned by the obvious presence of organic matters in the soils where they grow, and by the fact that some species exhale ammoniacal gases, but it is fully established by the experiments of Boussaingault. This chemist grew clover, peas, wheat, and oats in a soil completely destitute of organic matter, and supplied them with distilled water only; the clover and peas were found to double their azotized matter during growth, whilst the oats and wheat gained none whatever. As there was but one

source of azote present, the atmosphere, it is apparent that the former have the capacity of supplying themselves therefrom; whilst the grain plants are altogether dependent on the soil. Hence, in a soil charged with organic matters, rich in azote, those plants which require a supply by their roots will grow freely, and so far exhaust it in time as to render it unfit for the species, which is succeeded by an intermediate class, and finally by the *graminæ*, *leguminosæ*, and others capable of subsisting on aerial azote, and so far from exhausting, adding it to the soil. From this function of plants, we see an explanation of the natural rotation, and what is of more moment, a means of adapting our succession of crops to the accumulation as well as removal of azotized matters."

By most of the French scientific agriculturists, including Boussaingault and Payen, the value of manures is estimated according to the amount of azote they contain. With them, therefore, the great object of manuring is the application of azote to the soil, and the great, if not the sole, principle in rotations is the economy of this body. Crops are to be introduced in such order, that after the application of the manure a highly exhausting plant, as wheat, may come, and this be succeeded by others of less affinity for nitrogen; and, again, by those which draw their supplies from the air and are the ameliorating crops of this class of agriculturists. The soil, now recruited by clover, lucern, grass, &c., will bear another azotized crop, and the system is at an end.

There is something charmingly simple and plausible in this "one principle rotation," as Dr. Gardner terms it. But, he remarks, our corn, wheat, and oats, not only draw azote from the soil, but other bodies, namely, the inorganic and saline matters, much more of which is often withdrawn than of azote. He refers to a paper read by him before the Association the previous year, containing the results of a thorough examination made by him into the nature of the exhaustion of lands by seed crops. The object of that communication was to prove the following points:—

"1. That all seeds contain an excess of phosphoric acid, amounting usually to thirty-five or forty per cent. of the entire ash, nearly the whole of the ash being in many cases phosphates; this was demonstrated in the case of corn, wheat, beans, hemp seed, flax, peas, cotton, and other plants. It was also shewn that the straw and haulm seldom contain more than one to three per cent. of phosphoric acid, this substance being segregated in the seed. For the analytical evidence of these positions I beg to refer to the Farmer's Dictionary, in which the admitted analyses of all plants hitherto examined will be found.

2. "That phosphoric acid is the least developed of all the mineral bodies of the soil, being seldom present to the extent of 0.5 per cent., and usually less than 0.1 per cent., in good soils.

3. "That many soils containing from five to twelve per cent. of humus are known to be sterile.

4. "That the amount of phosphoric acid removed by given seed crops far exceeds that removed by the ordinary forage crops, being often five times as great.

"The evidence of these positions was set forth at length in that communication, and is therefore not worthy of repetition. The principle, which I believe was fairly reached and admitted, was, that seed crops exhaust the soil of phosphoric acid—the deprivation of which is easily perceived, even in the best lands. It is not necessary for me to advance further evidence of this fact before your Association.

"If it be admitted that phosphoric acid is segregated in the seeds, it is evident that the exhaustion effected by foliage plants, as tobacco, cabbages, flax, hemp, &c., not intended for seed, and of the root crops, with perhaps the exception of turnips, is due to another cause. The experiments of Boussaingault, and our own observations on natural rotations, will now throw light on this other kind of exhaustion. Some plants draw all their azote from organized matters in the soil, others from the air: some families of plants appear only on rich soils and around dung-hills, while others inhabit the mineral earth destitute of organic matters. It is evident that phosphoric acid has nothing to do with this peculiarity, for none is removed from the soil, the dead plants restoring it; there is a diminution only in volatile matters or in the azotized products of the decaying organic matter. Let us cultivate a few crops of cabbages or tobacco on a rich spot of land, how soon will the organic matter disappear! Practical men may tell us that this is because the crops are hoed and the soil exposed to the sun, but this is not the cause; the hoeing improves the plant, because, by introducing air it hastens the decomposition of the organic matters of the soil or assists the fixation of atmospheric nitrogen. (See *Mulder Journ. für Pract. Chem.* XXXII. p. 344). When putrescent manures are added to tobacco, potatoes, and similar crops, the indication is to furnish azotized matters, and is altogether different from the object in view when it is added to wheat and certain grain crops. But if this point requires further evidence we may appeal to those plants which exhaust the soil differently under different circumstances. A flax crop raised for its fibre exhausts the soil of azote, and may be followed by corn or beans, but if it be allowed to mature seeds, it exhausts the soil doubly of azotized matter and phosphoric acid, and cannot be succeeded by corn, except in the richest soils. Hemp raised for fibre may be cultivated many years in a soil containing much humus, but the seed crops are rapidly exhausting.

"Hence we have crops which exhaust the soil of azotized mat-

ters—crops which remove an excess of phosphoric acid—and grasses and clovers, cut before bearing seeds, which exhaust the soil of neither of these essential bodies, but on the other hand enrich it in organic matters. Many cultivated plants, as corn, wheat, cotton, hemp, flax, cabbages, &c., raised for seed, exhaust in both respects and are therefore peculiarly expensive crops. With this amount of information, based on experience and several hundred analyses, we have the means of rendering intelligible the precepts of practical writers on the succession of crops.

"Precept first resolves itself into the principle, that plants exhaust the soil unequally in respect to azotized matters, and must, therefore, be so adjusted that the most exhausting should recur as seldom as possible.

"Precept second.—Seed crops, which exhaust the soil of phosphoric acid, are to be interchanged with herbage plants, which do not remove as much of this important substance.

"These directions have now assumed a definite form, and are an explicit guide to the well-informed farmer; he at once perceives that there are, over and above the precepts of expediency, as to hoed or cleaning crops and deep-rooted crops, classes of plants which differ remarkably from each other in their action on his fields. 1. Seed crops which exhaust the soil of azote. 2. Seed crops which do not exhaust the soil of azote. 3. Exhausting forage and root crops. 4. Crops which neither exhaust the soil of humus nor phosphates, but renovate the azote. With this amount of knowledge he can shape a fair system of rotation, whatever may be his crops—he can introduce indigo, cotton, tobacco, corn, bean, oil-plants, and many others which are not found in the arbitrary tables given by Low, Thaer, and Stephens, or falsely placed by Buel and Armstrong. But if we recur to our definition of the object of a rotation—the production of the greatest profit in crops, with the least exhaustion of the soil or manure—we find that there is yet something wanting in the principles of rotation. In the fourth class above, we have plants which neither exhaust the soil of azote nor phosphoric acid; it now becomes necessary to know in what respect they do exhaust it, so as to satisfy the economical condition of impoverishing the soil in the least degree."

In addition to the well known affinity of plants for phosphoric acid, without which they cannot ripen their grain or seed, chemical analyses, now extended to several hundred subjects, shew the precise substances or alkaline bases taken up by different individuals. The classes which prefer *potash* are the composite, umbelliferous, amentaceous, gramineous, and chenepodiaceous; those which most affect *lime*, are the liguminous, rosaceous, solanaceous, and rubaceous; those selecting *soda* are the families of crucifera, asphodelœ, and liliacea.

In thus grouping plants with relation to the mineral bases which they most affect, it is necessary to bear in mind the existence of what has been termed an isomorphism amongst many of the mineral bodies. Isomorphism may be defined the connection between the external form and the chemical composition of bodies. Isomorphous substances are those which possess the property of mutually replacing one another in combinations without varying the form of the same. Thus—potash, soda, oxide of ammonium, and hydrate of lime—lime and magnesia—sesqui-oxide of iron, sesqui-oxide of manganese and alumina—sulphuric and selenic acids—phosphoric and arsenic acids—are respectively enumerated as isomorphous groups; that is to say, soda may replace potash; hydrated or slaked lime may be present in place of either soda or potash. In proof of this, soda has been found by chemical analyses to replace potash in the ashes of the oak on the sea-coast of Long Island. Grapes cultivated near the low salt plains of New Jersey, have been found to contain soda instead of potash. On the other hand, marine plants, transplanted to an interior situation, are found to contain potash. Tobaccos from various sources, analysed by Berthier, yielded potash as a base; whilst specimens, examined by Fresenius and Will, yielded 60 per cent. of lime and magnesia.

It must also be observed, that the different parts of the same plant yield an excess of dissimilar salts. The potato tuber contains 80 per cent. of potash,—whilst analysis of the tops gives 61 per cent. of lime. Chemical examinations of different plants will therefore shew different results with the same plant raised upon different soils, or at different times in the same soil. The French Government agents, finding a great depreciation in the tobaccos imported from the United States, set about an investigation, which resulted in shewing, that in the place of the salts of potash, formerly obtained in the good specimens analysed by Berthier, the salts of lime predominated in the inferior specimens of more recent growth.

Dr. Gardner thinks, that in determining the place of a plant in the saline groups, the ashes of the leaves should be selected as the true guide, chiefly because the leaf is the important organ of vegetation in which the sap is elaborated, and the future growth of the plant provided for. If the view of Raspail be correct, that the presence of saline matters in tissues is the essential of their organization and true source of their distinction from the mere proximate principles of which they are composed, it is a necessary consequence, that the organizing portion of the plant—the leaf—should contain the essential saline matters, without which, or other isomorphous substitutes, it could not be developed, nor carry on its functions; and if the leaf does not flourish, the plant cannot attain perfection.

With regard to the influence exerted upon plants by cultivation, Dr. Gardner observes :—

"Under natural circumstances, all the grain-bearing plants require little azotized matter; but from the development which many, such as wheat and barley, have acquired, they have become azotized plants, and are not to be maintained in their present state without a large supply of this food made to the roots. Many garden vegetables are also of this kind; the cabbage, in nature, consists of a few tough leaves, and inhabits soils of ordinary fertility on the sea-side; its present luxurious development, by which it attains a weight certainly a hundred times greater in several varieties, is the result of supplying food to the root in tillage; and if the supply be diminished, the characters of the variety are soon lost, and the vegetable degenerates.

"The following table will shew the position of most cultivated plants, so far as evidence exists at present. The conditions, under which the classification has been made, should be borne in mind.

Plants requiring much azote in the soil.	Seed bearing,	Lime,	Hemp seed, Cotton, Hop, cultivated Peas.
		Potash,	Corn, Madia, Wheat, Rice, Oats, Barley.
		Soda with Sulphur,	Rape seed, Colza, Mustard seed, Linseed.
	Foliage or root crops,	Lime,	Tobacco, Potatoes, Hemp, Indigo, Madder.
		Potash,	Sugar-cane, Carrots, Parsnips, Mangel-wurzel, Beets, Spinach.
		Soda with Sulphur,	Turnips, Kohlrabi, Ruta baga, Cabbages, Onions. Asparagus.
Plants requiring little or no azote in the soil.	Seed bearing,	Lime,	Field Beans, Pindars, Vetches.
		Potash,	Rye, German and Polish Millet, Buckwheat.
	Foliage or root crops.	Lime,	Pomaceous fruits, Lupius for fallowing Clovers, Spurry, Lucern, Sainfoin; all cut before seed.
		Potash,	Meadow Grasses, Jerusalem Artichoke.

"Thus the table presents ten groups of plants to be employed in a rotation, which are variously exhausting of saline matters, and exhausting or ameliorating as respects azote."

The fitness of a farm to produce remunerating crops may, for the most part, be estimated from an examination of the preceding table. In converting the minerals of the earth into crops, we must adopt such a system of rotation as will not exhaust the bases of fertility too rapidly, without compensation from some source. If, in a situation where every product is marketable, we adopt a series of rotation in which the crops draw from the earth only phosphoric acid, the purchase of azote, lime, potash, and sulphur, would be of no advantage, but on the contrary, just so much money spent unprofitably. By a judicious succession of crops, however, each fertilizing agent in the soil may be converted into money without loss or improvidence.

"As," in the language of Dr. Gardner,—"we have paid for every kind of plant-food in the earth, we incur a loss by allowing any part to remain unappropriated.

"The farm having reached its high point of tillage by suitable means, is now to be cropped for profit, and reduced thereby to a practical standard—what are the general principles on which this cropping is to be conducted? Obviously by a system of rotation, during which every saline and azotized matter that becomes soluble is removed, and no part is wasted. This can be accomplished only by introducing such crops as have severally an affinity for the various kinds of plant nutriment, and adapting them to the proportion of food present in the soil. Phosphoric acid is the rare ingredient of soils and manures, excepting guano and bones, the former of which contains 12 and the latter 25 per cent. of this body. Next after this, is the azotized matter, which forms a small per centage of vegetable mould (0.5 to 3.0 per cent,) and is therefore to be removed cautiously. Sulphuric acid is present to some extent in all soils, abounding most in ancient marls and gypseous formations. The supplies of lime and alkalies are very much greater than any of the preceding bodies; the former attaining 10, and the latter 4 to 5 per cent. in rich alluvial lands. The extent to which we may remove these in a rotation, is as their probable amount in the soil, which may be taken, in general terms, after the following rates per cent. in a perfect alluvial soil: Phosphoric acid 0.20—azotized matter 0.25—sulphuric acid 0.10—alkalies 2.00—lime and magnesia 5.00. In estimating the consumption, we must know the amount and kind of bodies removed with each crop. The difference of average crops in this respect is remarkably striking, and the subject has been fully detailed in my lectures in the university. It may be proper, here, to adduce, by way of illustration a few cases:—A crop of wheat of 25 bushels, with straw, removes 123 lbs. of inorganic matters, consisting of about 12 lbs. of phosphoric acid, 90 lbs. of silica, and 15 lbs. of alkaline salts. A crop of lucern of two tons removes 425 lbs. of mineral bodies, of which about 250 lbs. are

lime, and 20 lbs. sulphuric acid. Eight hundred bushels of beets remove about 360 lbs. of ashes, of which 316 lbs. are alkaline salts.

"It would be tedious, and out of place, to read here the tables upon which these calculations are made; it may be enough to state that they have been made, and that they form one of the necessary items of knowledge in constructing a perfect rotation. In addition to this, every expedient used by practical men, as the introduction of cleaning crops, green fallows, depasturing fall crops, the employment of roots, &c., are to be attended to in carrying out the design of the rotation—the economy of the mineral and organic aliments of the soil."

Dr. Gardner pays a just tribute to the Norfolk system of rotation, the general adoption of which, in many parts of England, has raised entire counties from sterility to the highest state of prosperity. "It consists of the following succession:—first year, manure, followed by turnips; second year, barley sown with clover; third year, clover, the first crop cut, then depastured and ploughed for wheat; fourth year, wheat, succeeded by manure and turnips, as before. In this system, the manure is followed by the plant requiring the most azotized matter. It is also a soda and sulphuric acid crop. Barley, the second crop, requires very much less azotized matter, and exhausts the soil of only a limited amount of phosphoric acid and potash. This is succeeded by a lime plant, clover, which recruits the azotized matter and loosens the soil by its long roots. Wheat, which completes the rotation, is a potash and phosphoric acid crop, requiring a medium supply of organic matter. This rotation, when we consider the soil and the manures used, the former siliceous, and the latter farm-yard compost and bone earth, is a perfect embodiment of the foregoing principles. Reached entirely by experimental means, it is strictly conformable with science; and is a striking illustration of the correctness of the doctrine, that rotations form a chemical study, which, originating with *Chaptal*, has been maintained to our day."

He concludes his highly interesting memoir by presenting examples of five year rotations, adapted to peculiarities of soil, &c., in the United States. The plants he proposes for the several soils are indicated by the probable excess of mineral matters and phosphoric acid therein. "The crops which may be substituted are placed vertically under the principal plant. There is in the rotation for clay soils a mechanical impediment, arising from the difficulty of keeping them in tilth, which influences the plan; and in sandy soils, also, it is necessary that too many hoed crops be not introduced, and that grazing be practised to render the soil compact. The rotations given are applicable north of Carolina."

I. *A Rotation for Good Mixed Soils.*

	First Year.	Second Year.	Third Year.	Fourth Year.	Fifth Year.
Manure—or the soil in the highest condition.	Corn.	Oats, Rye, Barley. Clovers, Grasses,	Clovers, Grasses.	Potatoes.	Wheat, Oats, Barley. Carrots, Parsnips.

II. *A Rotation for Rich Calcareous Soils.*

	First Year.	Second Year.	Third Year.	Fourth Year.	Fifth Year.
Manures, &c.	Potatoes, Hemp, Tobacco.	Wheat, Barley. Clovers,	Clovers.	Corn, Beans.	Oats, Rye.

III. *A Rotation for Rich Siliceous Soils.*

	First Year.	Second Year.	Third Year.	Fourth Year.	Fifth Year.
Manures, &c.	Turnips, Rutabaga, Beets, &c.	Rye, Grasses, Oats (Spurry), Barley.	Grasses fed off, (Spurry), ,,	Corn, Wheat, Buckwheat.	Jerusalem artichoke, Rye.

IV. *A Rotation for Clay Soils.*

	First Year.	Second Year.	Third Year.	Fourth Year.	Fifth Year.
Manures, &c.	Corn.	Oats, Clover, Rye, or Grasses.	Clover, Grasses.	Potatoes, Beets.	Wheat, Barley. Oats, Beans.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1847.

Mar. 29. *Charles White, George Lister Haynes, and Charles Beirs,* of 61, Back Church-lane, Whitechapel, for a capstan.

29. *Charles White, G. L. Haynes, and Charles Beirs,* for a windlass.

Mar. 31. *Thomas Crump*, of Derby, gas engineer, for an improved purifying gas-burner.

31. *William Sanderson*, of 96, Carver-street, Sheffield, for a balance-handle for knives and forks.

Apr. 1. *E. & B. Latchford*, of St. Martin's-lane, bit, stirrup, and spur makers, for the Albert bit.

3. *John Ward*, of the Marché aux Bêtes, Lille, France, machinist, for a heckle for heckling fibrous materials.

3. *Joseph Bunnett*, of 26, Lombard-street, engineer, for a revolving wood shutter.

6. *George Wallis*, of 31, Sidmouth-street, Gray's Inn-road, for perforated and embossed zinc, for gig and coach work.

6. *George Hadfield*, of the Seacombe Varnish and Color Works, Cheshire, for a design for securing keg or case.

7. *Harriot Sinclair*, of Fountain-place, City-road, for an elastic bonnet and cap stand.

7. *George Dixon Hedley, M.D.*, of Bedford, for an improved inhaler.

7. *James Izod and James Walter Baseley*, of Wheatsheaf-yard, Farringdon-street, roller manufacturers, for an economical sealing-wax holder.

8. *Felix Abate*, of London, civil engineer and architect, for a self-acting hydrostatic valve for sewers, drains, &c.

8. *James Parkes & Son*, of 5, St. Mary's-row, Birmingham, for an illuminated night clock.

8. *John Whitehouse & Son*, of 87, Birchall-street, Birmingham, brass-founders, for a bell-lever.

10. *Benjamin Biram*, of Wentworth, for an improved miner's safety-lamp.

10. *Robert Boure*, of 1, Fowkes-buildings, Great Tower-street, London, for a glass ventilating pane.

10. *Harry Morris*, of Chancery-lane, for a shirt.

12. *Cowley and James*, of Walsall, Staffordshire, for a steam-cock.

15. *Henry Ward*, of Northampton, surgeon, for an ether-inhaler.

15. *Alfred Augustus de Reginald Hely*, of 21, Manchester-buildings, Westminster, for a flexible floating-cylinder, applicable to the construction of life-rafts, floats, &c., for the preservation of life, &c., from shipwreck, &c.

17. *George Ritchie*, of Skinner-street, Snow-hill, for a spirit lamp.

Apr. 17. *Henry Mitchell*, of 194, Regent-street, for a hat-ventilator.

19. *Alexander Miller*, of 27, Lothian-street, Edinburgh, saddler and harness maker, for a fuel saveall, and dust consumer.

20. *David Manton*, of 12, Wellington-street, Newington-causeway, for a railway signal-lamp.

20. *Benjamin Browne*, of 376, Strand, London, for a telegraph for omnibuses.

List of Patents

That have passed the Great Seal of IRELAND, from the 17th March to the 17th April, 1847, inclusive.

To Peter Claussen, of Leicester-square, in the county of Middlesex, Esq., for improvements in machinery for weaving.—Sealed 20th March.

William Newton, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, civil engineer, for an invention of certain improvements in engines, to be worked by gas, vapour, or steam, either separately or in combination,—being a communication from a foreigner residing abroad.—Sealed 26th March.

Frederick Ransome, of Ipswich, engineer, for improvements in the manufacture of artificial stone,—in combining small coal and other matters, and in preserving wood.—Sealed 26th March.

Alfred Brett, of Holborn-bars, Gent., and George Little, of High Holborn, electrical engineer, for improvements in telegraphs, and in the arrangement and apparatus to be used therein and therewith; parts of which improvements are also applicable to time-keepers, and other useful purposes.—Sealed 27th March.

Albert Robert Cunningham, of Sydenham, in the county of Kent, Gent., and Joseph Threlfall Carter, of the same place, engineer, for improvements in propelling carriages on railways.—Sealed 29th March.

William Pidding, of Alfred-place, Bedford-square, in the county of Middlesex, Gent., for certain improvements in carriages.—Sealed 12th April.

Robert Heath, of Manchester, in the county of Lancaster, Esq., for certain improvements in wheels, to be used upon rail and other roads; which improvements are also applicable to mill-gearing, and other similar purposes.—Sealed 12th April.

List of Patents

Granted for SCOTLAND, subsequent to March 22nd, 1847.

To Charles Tennant Dunlop, of Glasgow, manufacturer, for improvements in the manufacture of alkali and chlorine, and in the application of the products resulting therefrom.—Sealed 23rd March.

Thomas Hunt Barber, of King-street, Cheapside, London, merchant, for improvements in machinery or apparatus for dredging or excavating,—being a foreign communication.—Sealed 23rd March.

John Leslie, of Conduit-street, Hanover-square, London, tailor to Her Majesty, for improvements in the combustion of gas.—Sealed 26th March.

Alexander Morton, of Morton place, Kilmarnock, for improvements in printing warps.—Sealed 26th March.

François Stanilas Meldon De Sussex, manufacturing chemist, for improvements in smelting copper and other ore.—Sealed 31st March.

Alexander Bain, of Baker-street, London, electrical engineer, for improvements in electrical clocks and time-keepers, and in apparatus connected therewith.—Sealed 31st March.

William Farthing, of Kingston-upon-Hull, merchant, for improvements in the manufacture of glass.—Sealed 1st April.

William Henry Hatcher, of 345, Strand, London, civil engineer, for improvements in electrical telegraphs, and in apparatus connected therewith; and also in electric clocks and time-keepers.—Sealed 6th April.

George Ferguson Wilson, of Belmont, Vauxhall, Surrey, for improvements in the production of light, and in the manufacture or preparation of materials applicable thereto.—Sealed 6th April.

John Lowe, of Manchester, civil engineer, and James Simpson, of the same place, joiner, for certain improvements applicable to carriages to be used upon railways; part of which improvements may also be used on other roads.—Sealed 7th April.

Bartholomew Beniowski, of Bow-street, London, Major in the late Polish army, for certain improvements in the apparatus for, and process of, printing.—Sealed 12th April.

Frederick Muntz, of Birmingham, M.P., for an improved manufacture of metal plates for sheathing the bottoms of ships and other vessels, and also in bolts and other the like purposes.—Sealed 13th April.

Patrick Moir Crane, of Yuiscedwyn Iron Works, near Swansea, for improvements in the manufacture of iron.—Sealed 13th April.

William Pidding, of Alfred-place, Bedford-square, London, for certain improvements in carriages.—Sealed 13th April.

Charles Heard Wild, of Mortimer-street, Cavendish-square, London, civil engineer, for improvements in constructing parts of railways.—Sealed 16th April.

Onesiphore Pecqueur, of Paris, engineer, for improvements in forming leather into tubes., switches, cases, hats, and other articles.—Sealed 16th April.

New Patents
SEALED IN ENGLAND.
1847.

To William Phillips Parker, of Lime-street, in the city of London, Gent., for an improved mode of manufacturing cigars. Sealed 1st April—2 months for inrolment.

Benjamin Tucker Stratton, of Bristol, agricultural machinist, for improvements in railways, and in wheels and other parts of carriages for railways and common roads, partly applicable in the construction of ships or other vessels; and improvements in the machinery for manufacturing certain parts of the same. Sealed 6th April—6 months for inrolment.

Charles De Bergue, of Arthur-street West, in the city of London, engineer, and John Coope Haddan, of Upper Woburn-place, Middlesex, civil engineer, for improvements in wheeled carriages, and in panels and springs for carriages, and other purposes. Sealed 8th April—6 months for inrolment.

Stephen Moulton, of Norfolk-street, Strand, Middlesex, Gent., for improvements in the construction of bridges,—being a communication. Sealed 8th April—6 months for inrolment.

William Tharpe Stevenson, of Upper Baker-street, Lloyd-square, Middlesex, for improvements in regulating the generating of steam in steam-boilers. Sealed 8th April—6 months for inrolment.

David Napier, of Glenhellish Strachen, Argylshire, for improvements in steam-engines and steam-vessels. Sealed 8th April—6 months for inrolmeut.

Patrick Moir Crane, of Yuiscedwyn Iron Works, near Swansea, for improvements in the manufacture of iron. Sealed 8th April—6 months for inrolment.

Stephen White, of 30, Winchester-row, New-road, Middlesex, for a new means of producing gas, both as to apparatus and materials from which the gas is produced. Sealed 15th April—6 months for inrolment.

Alfred Vincent Newton, of the Patent Office, 66, Chancery-lane, Middlesex, mechanical draughtsman, for improved apparatus to be applied to steam-boilers; being a communication. Sealed 15th April—6 months for inrolment.

Samuel Childs, of Earls-court-road, Middlesex, wax-chandler, for certain improvements in the manufacture of candles, and in preparing and combining certain animal, vegetable, and mineral substances, applicable to the manufacture of candles, and other uses. Sealed 15th April—6 months for inrolment.

John Mollett, of Austin-Friars-passage, in the city of London, merchant, for improvements in fire-arms and in cartridges; being a communication. Sealed 15th April—6 months for inrolment.

Peter Claussen, of Leicester-square, in the county of Middlesex, Gent., for certain improvements in weaving machinery, and in the preparation of the materials employed in weaving; being a communication. Sealed 15th April—6 months for inroment.

Charles Minors Collett, of Chancery-lane, Middlesex, Gent., for certain apparatus and arrangements for affording additional security in locks; being a communication. Sealed 15th April—6 months for inrolment.

James Robson, of Dover, in the county of Kent, engineer, for a new and improved instrument, to be used in crushing or expressing oil from vegetable and other substances, and in making oil-cake; and which instrument is applicable to the moulding, pressing, and manufacturing the same and other articles from plastic materials. Sealed 15th April—6 months for inrolment.

George Holworthy Palmer, of Surrey-square, Old Kent-road, civil engineer, for an improved method or mode of producing inflammable gases of greater purity and higher illuminating power than those in use; and also in the arrangement of the apparatus employed for the purpose; and which apparatus may be applied to other similar purposes. Sealed 17th April—6 months for inrolment.

Joseph Woods, of Bucklersbury, in the city of London, engineer, for certain improvements in springs for supporting heavy bodies, and resisting sudden and continuous pressure; being a communication. Sealed 20th April—6 months for inrolment.

John Fisher, the younger, of Radford Works, in the county of Nottingham, mechanician, for improvements in arranging or folding certain narrow fabrics. Sealed 20th April—6 months for inrolment.

Samuel Kenrick, of Handsworth, in the county of Stafford, iron-founder, for certain improvements in preparing or forming moulds for casting metal. Sealed 20th April—6 months for inrolment.

George William Rowley, of Welbeck-street, Cavendish-square, Middlesex, Gent., for improvements in the construction of carriages, and in apparatus to be used with omnibuses and other carriages. Sealed 20th April—6 months for inrolment.

Thomas Brown, of Muscovy-court, Tower-hill, in the city of London, agent, for improvements in machinery for raising and lowering weights; being a communication. Sealed 20th April 6 months for inrolment.

Osman Giddy, of Hereford Lodge, Old Brompton, Middlesex, Gent., for improvements in apparatus for sweeping or cleansing chimneys and flues. Sealed 20th April—6 months for inrolment.

Philip Burnard Ayres, of No. 12, Howland-street, Fitzroy-square, in the county of Middlesex, M.D., for certain plans and improvements in preparing putrescent organic matters, such as night-soil, the matter in suspension in the water of sewers, and other similar matters, for the purpose of manure, or for other purposes, and for apparatus for the same. Sealed 20th April—4 months for inrolment.

John Walker, of Crooked-lane, in the city of London, engineer, for improvements in certain hydraulic and pneumatic machines, and in the application of steam or other power thereto. Sealed 22nd April—6 months for inrolment.

Theodore Hyla Jennens, of Birmingham, manufacturer, for an improved method or improved methods of manufacturing papier-mâché articles; also a new or improved method of ornamenting papier-mâché articles; which said method of ornamenting papier-mâché articles is also applicable for ornamental purposes generally. Sealed 24th April—6 months for inrolment.

Jonathan Atkinson, of Liverpool, soap boiler, for a new method of manufacturing soap. Sealed 27th April—6 months for inrolment.

John Morgan, of East Greenwich, manager, for certain improvements in machinery applicable to preparing and spinning flax and hemp, and other fibrous substances. Sealed 27th April—6 months for inrolment.

Marie Melanie D'Hervilly Hahneman, of Rue Clichy, Paris, and Henry Petitpierre, of Place de Chateau Rouge, Paris, for improvements in instruments for writing. Sealed 27th April—6 months for inrolment.

Alfred Vincent Newton, of the Office for Patents, 66, Chancery-lane, Middlesex, mechanical draughtsman, for certain improvements in the construction of roads or ways, and in the carriages to be used thereon; being a communication. Sealed 27th April—6 months for inrolment.

Caroline Watson, of Chorley, in the county of Lancaster, for improvements in apparatus for filtering; being a communication. Sealed 27th April—6 months for inrolment.

Thomas Denne, of Bermondsey, in the county of Surrey, strap manufacturer, for improvements in the manufacture of grease, or compositions for atmospheric pipes, and for lubricating the axles and moving parts of machinery. Sealed 27th April—6 months for inrolment.

John Coates, of Seedly, in the county of Lancaster, calico printer, for certain improvements in machinery, or apparatus for cleaning the surface of woven fabrics, or freeing the same from fibrous or other loose matters, previous to printing thereon. Sealed 27th April—6 months for inrolment.

George Thomson, of Nottingham, cabinet maker, for improvements in machinery for sawing wood and other substances. Sealed 27th April—6 months for inrolment.

CELESTIAL PHENOMENA FOR MAY, 1847.

D.	H.	M.	
1			Clock after the ☉ 3m. 0s.
			☽ rises 8h. 28m. A.
			☽ passes mer. 0h. 20m. A.
			☽ sets 5h. 10m. M.
	20	38	☿ in conj. with ♅ diff. of dec. 2. 32 S.
5			Clock after the sun, 3m. 28s.
—			☽ rises Morn.
—			☽ passes mer. 3h. 46m. A.
—			☽ sets 8h. 17m. M.
	14		♀ in Perihelion
	23	8	♀ in conj. with ♃ diff of dec. 1. 49. N.
7	10	49	☽ in □ or last quarter
8	17	42	♂ in conj. with the ☽ diff. of dec. 5. 47. S.
9	7	39	♄ in conj. with the ☽ diff. of dec. 5. 4. S.
	14	8	♀ in conj. with Ceres, diff. of dec. 0. 27. S.
10			Clock after the sun, 3m. 49s.
—			☽ rises 2h. 15m. M.
—			☽ passes mer. 8h. 12m. A.
—			☽ sets 2h. 21m. A.
11	12		☽ in Perigee
11	14	54	♅ in conj. with the ☽ diff. of dec. 0. 53. S.
12	3	32	☿ greatest hel. lat. S.
	12	42	☿ in conj. with the ☽ diff. of dec. 1. 46. S.
14	3	23	Ecliptic conj. or ● new moon
	8	29	♃'s first sat. will em.
15			Clock after the sun, 3m. 55s.
—			☽ rises 5h. 8m. M.
—			☽ passes mer. 0h. 48m. A.
—			☽ sets 8h. 39m. A.
	9	54	♃'s second sat. will em.
16			Juno stationary
	2	10	♃ in conj. with the ☽ diff. of dec. 4. 21. N.
22	18		♀ in conj. with the ☽ diff. of dec. 6. 52. N.
17			Mercury R. A. 2h. 19m. dec. 11. 35. N.
—			Venus R. A. 6h. 8m. dec. 25. 20. N.
—			Mars R.A. 22h. 44m. dec. 10. 6. S.
—			Vesta R. A. 12h. 39m. dec 7. 30. N.

D.	H.	M.	
17	—		Juno R. A. 19h. 35m. dec. 5. 37. S.
	—		Pallas R. A. 4h. 1m. dec. 2. 24. S.
	—		Ceres R. A. 5h. 43m. dec. 25. 43. N.
	—		Jupiter R. A. 5h. 20m. dec. 22. 53. N.
	—		Saturn R. A. 22h. 53m. dec. 8. 42. S.
	—		Georg. R. A. 1h. 1m. dec. 5. 54. N.
	—		Mercury passes mer. 22h. 44m.
	—		Venus passes mer. 2h. 30m.
	—		Mars passes mer. 19h. 5m.
	—		Jupiter passes mer. 1h. 42m.
	—		Saturn passes mer. 19h. 14m.
	—		Georg. passes mer. 21. 20.
18			Occul. *k* Geminorum, im. 8h. 50m. em. 9h. 40m.
19	8	25	♃'s third sat. will em.
20			Clock after the sun 3m. 53s.
	—		☽ rises 6h. 45m. M.
	—		☽ passes mer. 2h. 39m. A.
	—		☽ sets 10h 30m. A.
21	6	43	Pallas in conj. with the ☉
	12	17	♂ in conj. *with* ♄ diff. of dec. 0. 21. S.
22	1	59	☽ in □ or first quarter
22	4	8	Vesta stationary
23			Occul. *υ* Leonis, im. 11h. 36m. em. 12. 40.
23	9		☽ in Apogee
25			Clock after the sun 3m. 26s.
	—		☽ rises 3h. 4m. A.
	—		☽ passes mer. 8h. 44m. A.
	—		☽ sets 1h. 53m. M.
27	19	35	♀ greatest hel. lat. N.
28			Occul. ζ3 Libræ, im. 7h. 48m. em. 8h 38m.
	—		Occul. ζ4 Libræ, im. 9h. 4m. em. 10h. 15m.
29			Occul. *x* Ophiuchi, im. 9h. 46m. em. 10h. 4m.
30			Clock after the sun 2m. 52s.
	—		☽ rises 8h. 19m. A.
	—		☽ passes mer. Morn.
	—		☽ sets 4h. 25m. M.
0	0	46	Ecliptic oppo. or ○ full moon.

The eclipses of the Satellites of Jupiter are not visible from the 23rd day of May until the 18th day July, Jupiter being too near the Sun.

J. LEWTHWAITE, Rotherhithe.

THE

LONDON JOURNAL,

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CONJOINED SERIES.

No. CLXXXVI.

RECENT PATENTS.

To William Cotton, *of Loughborough, in the county of Leicester, manufacturer, for certain improvements in knitting machinery.*—[Sealed 22nd June, 1846.]

These improvements in knitting machinery are designed to facilitate the operations of frame-work knitting, or the production of various qualities of goods or fabrics formed of looped threads, and commonly called knitted fabrics; the constructions and movements of the operating parts of the machinery being materially simplified, and consequently allowing the work to proceed with greater expedition and better effect than when using the ordinary knitting machinery.

The improved forms and arrangements of mechanism are represented in Plate XIV., of which fig. 1, is a partial longitudinal elevation of the front of the machine; fig. 2, is an end elevation of the same; and fig. 3, is a top or horizontal view. A, A, A, is the cast-iron frame-work or standards; B, is the beam or roller, carrying the threads or yarns to produce the work; C, is the work-beam, upon which the knitted fabric is wound as it comes from the needles; D, D, is the

crank-shaft in front (to be turned by the hands of the workman), by which the mechanism is actuated; E, E, are small fly-wheels, at the ends of the crank-shaft, to render its rotary motion uniform; F, is a stationary bar, extending the whole length of the machine, and to it the combs *p*, which are fixed in leads, are attached by screws.

Cams *a*, *a*, and *b*, *b*, are fixed upon the shaft D; the former to work the needle-bar, and the latter to work the guide-bar. The series of needles *c*, fixed in leads as usual, are mounted upon the bar G, which is supported by bent bracket-arms *e*, *e*, *e*, attached to the longitudinal rocking-shaft *f*, *f*, *f*. This shaft turns in plummer-blocks *g*, *g*, affixed to the standards at the ends of the machine. From the rocking-shaft *f*, lever-arms *h*, *h*, extend forward, carrying each an antifriction roller *d*, at its front extremity; which rollers run upon the peripheries of the cams *a*, *a*, and, consequently, by the rotation of the cams *a*, *a*, the rocking-shaft *f*, is caused to vibrate, and give to the needle-bar G, the required movements. The guides *i*, *i*, *i*, for conducting the threads to the needles are set in leads as usual, and are mounted on a bar H, which slides upon arms I, I, affixed to the rocking-shaft *k*. This shaft works on fulcrum-pivots, mounted in the small standards *l*, *l*, attached to the end of the machine. From the rocking-shaft *k*, bent lever-arms *m*, *m*, extend forward, carrying at their front extremities antifriction rollers *n*, *n*, which run upon the peripheries of the cams *b*, *b*. Hence, by the rotation of the cams *b*, *b*, the guides *i*, are made to vibrate.

Having now described the general features of the improved machine, the patentee proceeds to explain, in detail, the movements of the operating parts effected by the novel construction; and, for this purpose, he has represented sectional figures, upon an enlarged scale, taken transversely through the machine, shewing the positions of the needles and guides, with their appendages, at different stages of the operation of knitting.

Figs. 4, 5, and 6, are detached portions of the machine in section, taken transversely; these figures shew the needles *c*, and the guides *i*, in different positions, with the thread or yarn *j*, *j*, passing upward from the yarn-beam below, over a

guide-roller, to the needles, and the work or knitted fabric produced hanging down from the needles, as at *j**. In fig. 4, it will be seen, that the last loop of the knitted work *j**, hangs upon the shaft of the needle *c*; and that the thread or yarn *j*, extends straight from thence to the eye of the guide *i*; the guides being in a raised position, that is, above the ends of the needles, and the needles projected forward between the stationary combs *p*: such positions of the working parts being produced by the rotary cams *a*, and *b*, acting on the arms *h*, and *m*, of the rocking-shafts *f*, and *k*, as before described. Now, in order to pass the threads or yarns *j*, round the needles, for the formation of a fresh row of loops, the guides must be shogged, that is, collectively moved in a lateral direction over the beards of the needles *c*, which is done by the two-fold actions next to be described.

The needle-bar G, with its needles *c*, in coming forward to the position shewn at fig. 4, has caused a catch *q*, (seen at the right-hand end of the machine, fig. 3,) to act upon a horizontal ratchet-wheel *r*, mounted on a stud fixed in the standard-frame, and turn that wheel round part of a revolution. Attached to the ratchet-wheel *r*, is a cam-wheel O, formed with many steps or elevations and depressions upon its periphery, suited to different kinds of work; and as the cam is moved round with the ratchet, different elevations are brought against one end of a horizontal lever *s*, *s*, mounted on a fulcrum-pin and bracket, at the end of the machine. The other end of this lever is, by a rod *t*, made to communicate with the guide-bar H; and hence, every time that the ratchet *r*, and cam O, are moved, the guide-bar will be shogged, in order that the guides may carry forward their respective yarns, and lap them round other needles. A spring, at the opposite end of the bar, has a tendency to return the guides to their former position, immediately the step or raised portion on the cam O, which has just acted on the lever *s*, has passed the end of that lever. The guides having been thus shogged, and the threads or yarns brought over the needles, the guides are then, by the rotation of the cams *b*, *b*, made to descend into the position shewn at fig. 5. The

needle-bar at the same time, by the rotation of the cams *a*, *a*, recedes, and draws the threads or yarns under the beards of the needles.

It will be now necessary to depress the beards of the needles, in order that the yarns or threads, under the beards, may be drawn through the loops of the previously-made work, or, as it is more commonly expressed, that the row of loops may be passed over the beards of the needles. For this purpose the patentee employs a rocking presser-rod K, having an angular recess cut along its whole length at the under part, as represented in section at figs. 4, 5, and 6. The presser-rod K, is seen in its place, in the machine, at fig. 3, on the front side of the combs, there being a recess made along the whole length of the series of combs *p*, for the purpose of receiving the presser-rod K, (see figs. 4, 5, and 6.)

The presser-rod is held in its situation by arms L, L, L, which are connected, by hinge-joints, to curved springs M, M, M, affixed to the back of the stationary comb-bar F. The presser-rod K, is enabled to turn freely in the clips of the arms L, L, L; and there are fingers *u*, *u*, extending upwards from the presser-rod, which pass through slots in inclined arms N, fixed to the needle-bar G. It will now be seen that as the needle-bar G, moves to and fro, the arms N, will be moved with it, and by so doing will cause the ends of the slots at *v*, *v*, to act against the finger *u*, so as to turn the presser-rod K, upon its axis. In fig. 4, it will be seen that the advanced position of the needle-bar has caused the hinder part of the slot *v*, in the arm N, to raise the finger *u*, nearly into a perpendicular position; by which means the presser-rod K, is turned, so as to bring down its front angular edge. In this situation of the presser-rod, the threads or yarns are carried over the needles, and passed under their beards, as before said, by the shogging of the guides; the receding of the needles therefore brings their beards under the edge of the presser-rod, as shewn in fig. 5; by which means the threads or yarns are confined within or under the beards; and in this retiring of the needles (their beards being still

depressed), the previously-formed loops of work are brought against the front edges of the combs; and as the stems of the needles pass between the combs, the loops are pushed over the beards of the needles, leaving the last row of threads, now connected to them, under the beards, to form the next row of loops. The receding of the needle-bar has caused the end of the slot *v*, in the arm N, to draw the finger *u*, into the inclined position shewn at fig. 6; by which the presser-rod K, is turned, so as to release the beards of the needles; the needles are then left free to advance, and commence a new course, as described above, in reference to figs. 4.

The forms of the cams *a*, *a*, and *b*, *b*, for working the needle-bar and guide-bar, being such as are commonly used in frame-work knitting machinery, need not be particularly described; and the adaptation of cams for shogging the guide-bars being also well understood, a further description of such parts will be unnecessary, their form being varied according to the particular kind of work to be produced.

The patentee claims, generally, the novel arrangement of parts constituting the improved machine, whereby the number of motions, to produce looped fabrics, are considerably reduced, and, consequently, the machinery may be worked at a greater speed; and thus given lengths of fabric may be produced in considerably less time than by the ordinary construction of knitting machinery. And, particularly, he claims, First,—the application of the rocking presser-rod K, for depressing the beards of the needles; and also the mode of actuating that rod by the backward and forward movements of the needle-bar. Secondly,—the peculiar construction and arrangement of the fixed "combs," whereby the needles, in receding from the guides, are freed from the work formed on them; the loops being stopped by the edges of the combs, until the depressed beards have passed though them, as above explained.—[*Inrolled in the Petty Bag Office, December*, 1846.]

Specification drawn by Messrs. Newton and Son

To WILLIAM SEED, *of Preston, in the county of Lancaster, machine-maker, for his invention of certain improvements in machinery or apparatus for preparing, slubbing, and roving cotton and other fibrous substances.*—[Sealed 14th July, 1846.]

THIS invention refers to the construction of the flyer which is employed, in connection with the spindle, for the purpose of winding the sliver or roving upon the bobbin. The improvement consists in the application of the principle of centrifugal force to the flyers employed in slubbing or roving-frames, whereby the required elastic pressure of the small spur or lever, which conducts the sliver of cotton or other fibrous material on to the bobbin, is obtained, instead of employing springs or other analogous mechanical pressure.

By the application of this invention it is stated, that the bobbin of rovings will not only be made hard, but equally compressed throughout; as the pressure upon the same will be found to decrease slightly as the diameter of the bobbin increases, and thus equalize the formation thereof, instead of the outer or finished diameter being harder than the interior, as has hitherto been the case.

In Plate XVI., fig. 1, is a front elevation of the improved flyer; fig. 2, is a side or edge view of the same; and fig. 3, is a plan or horizontal view, as seen from above. *a*, is the spindle; *b*, the bobbin; and *c*, the flyer. To one or both of the legs of the flyer *c*, are attached two or more fixed bearings *d*, *d*, which support the guide or pressing apparatus *e*, *f*, *g*, formed of wire. The lower end *e*, of this wire is bent at right angles, and formed into a small spur or lever, for conducting and delivering the sliver or roving of cotton, &c., on to the bobbin; and the vertical portion *f*, of the wire swivels loosely in the bearings *d*, *d*, attached to the hollow flyer-leg: the upper end *g*, is also bent into the form shewn in the drawing, and has a small weight *h*, attached thereto. It will thus be evident, that as the flyer *c*, revolves at a high velocity, the weight *h*, upon the upper end of the wire, will be thrown from the centre, and cause the spur or lever *e*, at the lower end of the wire, to bear or press against the bobbin

b; the pressure slightly decreasing as the increasing diameter of the bobbin causes the weight *h*, to approach the centre of rotation.

The patentee remarks, that the above-described apparatus represents one particular and practicable mode of applying his invention; but he does not intend to confine himself exclusively thereto; but he claims the application of centrifugal force to the particular or special purpose above set forth, that is, to flyers used in machinery or apparatus for preparing, slubbing, and roving cotton and other fibrous materials, for the purpose of producing a hard and evenly-compressed bobbin.—[*Inrolled in the Petty Bag Office, January,* 1847.]

To William Thurman, *of the Town and County of Nottingham, hosier, for certain improvements in the manufacture of gloves, stockings, and other hosiery goods.*—[Sealed 18th July, 1846.]

This invention of improvements in the manufacture of gloves, stockings, and other hosiery goods, consists in the use of certain apparatus for producing a nap or pile on knitted fabrics, which are employed or are capable of being employed in the manufacturing of such articles; and, when required, the nap or pile may be dyed of a different color to the fabric. The apparatus employed for raising a pile or nap upon knitted fabrics is applied to the stocking-frame or other machine of that class, whether constructed to work by hand or other power; and by any convenient motion of such machines it may be readily actuated, and made to raise a pile or nap on the surface of the fabric, at the time such fabric is descending from the needles to the work-roller. The goods thus produced, when taken out of the machine, are sewn up in the form desired; the piled surface being generally on the inner face of the glove, shirt, or other article, whereby, in silk and cotton goods, as much warmth is obtained as when wool is used in the ordinary way for similar articles.

In Plate XIV., an arrangement of the improved apparatus is shewn as applied to an ordinary stocking-frame; fig. 1,

being a cross section, and fig. 2, a partial front view of the same. The cloth or knitted fabric is drawn down from the needles A, A, and wound on to the work-beam or roller B, and during its passage to the work-roller it is acted upon by the apparatus. C, is a horizontal bar, attached to the hand-bar D, of the machine, and upon it slides a carriage E, provided with antifriction rollers, to allow of it moving more easily: this carriage has affixed on its inner face a sheet of wire cards, and to each end of the carriage a cord F, F, is attached. The lower ends of these cords pass respectively between a pair of grooved pulleys G, thence over a pulley H, and are finally attached to a large pulley I, which has also attached to it the cords for actuating the "slur-cock or box," employed for depressing the jack-sinkers (as is well understood); and this pulley is made to perform part of a revolution, first to the right and then to the left, by the depression of the ordinary treadles K, K. It will thus be clearly understood, that at every depression of the treadles the carriage E, will be made to travel laterally over the face of the fabric, and the fabric being distended over the face of the hand-bar D, the card-teeth will teaze or tear up a portion of the fibre which composes the thread of the knitted fabric, and lay it smooth upon the face thereof.

The following are modifications which the patentee proposes, in some cases, to introduce into his apparatus for raising a pile on knitted fabrics. Fig. 3, represents, in cross section, a card-cylinder applied to a knitting-frame. A, is a rotating cylinder mounted in brackets on the face of the hand-bar B; at one end of the cylinder a ratchet-wheel C, is provided, and into its teeth a catch D, jointed to a fixed part of the framing, takes. When therefore the hand-bar B, is drawn forward by the workman, the ratchet-wheel C, slides under the catch D, but, on being returned to its former position, the tooth of the catch D, falls into a notch in the ratchet-wheel, and causes it, with the card-cylinder A, to perform part of a revolution. By this means (the knitted fabric descending, as before stated, from the needles) the teeth of the card-cylinder will teaze or tear up a pile or nap, and the same operation will be continued as long as the machine is in work.

Another mode of producing the pile is shewn at fig. 4. A flat bar A, is provided on its inner face with a sheet or fillet of cards; and this bar is attached, by adjusting-screws B, B, to the hand-bar C. Between the face of the hand-bar and the bar A, coiled springs (having the screws for their support) are employed for giving a little elasticity to the action of the cards. The bar A, being screwed up, so as to bring the teeth of the cards in contact with the fabric as it passes down to the work-roller, the machine is then put in action, and the teeth will, as before explained, draw out a portion of the fibres of the thread or yarn employed for producing the fabric, and lay it smooth on the face thereof.

A third modification consists in employing teazles in place of cards; and the mode in which they are secured for this purpose in a holder or carriage is shewn by the sectional fig. 5. One, two, or more slots are made in the holder, and these slots are enlarged at one end, for the purpose of readily admitting the teazles into the slots. These teazles are cut lengthways into gores, like the gores of an orange, and the woody part is slidden under the lips of the grooves. It is obvious that a similar plan may be adopted, if a rotating cylinder of teazles is employed, instead of the carriage shewn in the drawing; which carriage is intended to slide laterally, as explained with respect to figs. 1, and 2.

At fig. 6, a mode of applying the invention to warp-machines is shewn; but it is obvious that other arrangements may be made for effecting the same purpose, and such arrangements will depend entirely upon the nature of the knitting-machine to which the invention is intended to be applied. Let A, be supposed to be the driving-shaft of the machine; on this shaft a cam-wheel B, may be keyed, which, as it revolves, will come in contact with a lever C, and cause it to vibrate. If then a card-roller is provided, as at D, to act upon the fabric, this roller may be readily caused to rotate by a catch E, jointed to the lever C, taking into a ratchet-wheel F, on the shaft of the card-roller. A spring may support the catch, and keep it in contact with the ratchet-wheel; and a coiled spring may be applied to the lower end of the lever C, to draw it inwards, and cause its upper part to be in contact with the cam-wheel B.

In applying the invention to what are termed circular-knitting-machines, that is to say, machines in which the knitted fabric is produced in the shape of a tube, a ring, of the diameter of the fabric, is suspended at the lower end of such machine, as a substitute for a breast-beam, and the fabric is drawn over it as it is formed. To the outer face of the fabric, on a level with this ring, a ring of cards is applied or segments of cards are applied at different heights, but together encompassing the fabric, so that the teeth of such cards shall be in contact with the fabric as it passes down to be wound on the work-roller. By this means a pile or nap may be produced on a cylinder of knitted fabric while it is passing from the needles of the machine to the work-roller.

In order to dye the nap or pile produced on knitted fabrics of a different color to that of the body of the fabric, a trough is applied to the knitting-machine, for the purpose of holding dye-liquor. This trough is placed in the front of the fabric, as shewn at fig. 9, and is furnished with a doctor-roller, which takes up a portion of the liquor, and applies it to the surface of a brush rotating in contact with the pile of the fabric. By this means a portion of dye-liquor will be laid on the pile or nap, but not in sufficient quantity to penetrate the body of the fabric. A similar effect may be produced with advantage on small articles, such as gloves and mitts, by laying the color on by hand; but for larger articles and piece-goods the above is preferable; for if the roller and brush are set in motion by the action of the machine, in any convenient way, no time is required for effecting the dyeing beyond that which is necessary for producing the fabric. In order to distinguish the ordinary kinds of knitted gloves from those which are formed out of the improved hosiery fabric, the patentee proposes to finish those made under his patent upon a hand-board, similar to that used in the finishing of leather gloves; whereby they will assume a fullness approaching to the form of the human hand, in contradistinction to the flat appearance produced by employing the flat hand-board.

The patentee claims the application of carding or teazing surfaces to machines capable of producing hosiery goods or knitted fabrics; whereby he is enabled to produce a pile or

nap on the surfaces of such fabrics, while they are being manufactured in the machine. He also claims the several arrangements of apparatus, herein shewn and described, for carding or teazing the surfaces of hosiery goods or knitted fabrics, while such goods are being manufactured. And, Lastly,—dyeing or staining the pile or nap produced on hosiery goods, so as to give it a different color to that of the body of the fabric.—[*Inrolled in the Petty Bag Office, January,* 1847.]

Specification drawn by Messrs. Newton and Son.

To PETER FAIRBAIRN, *of Leeds, in the county of York, machine maker, and* PETER CARMICHAEL, *manager for Messrs. Baxter Brothers, & Co., flax spinners, Dundee, North Britain, for their invention of improvements in machinery for drawing, roving, and spinning flax, hemp, silk, and other fibrous substances.*—[Sealed 2nd October, 1846.]

THE first part of this invention applies to machinery for drawing the fibres of flax and hemp, and consists in the novel adaptation and arrangement of certain known mechanical agents for the purpose of aiding and improving the drawing of those fibrous materials, previously to their being formed into rovings or spun into yarn. The materials, flax, hemp, and tow, are frequently found in the condition of long and short fibres, intermixed after heckling, and also entangled together when coming from a carding engine; which fibres it is necessary to equalize and draw out straight before they can be submitted to the operations of roving and spinning. In the usual machinery employed for drawing out the fibres of the heckled and combed material, and also of the carded sliver, a series of travelling-bars, with heckle-points, have been introduced between the holding and drawing-rollers, as in the screw-gill machines; which heckle-points, being made to move onward with a slower speed than that of the advancing sliver, retained the shorter fibres of the material, and thereby enabled the drawing-rollers to draw out, straighten,

and equalize the shorter with the longer fibres, so as to produce a sliver of uniform substance, fit for the roving process. It has, however, been found, that on each of the descending heckle-bars of the screw-gill machinery quitting the sliver, a slight thickness or rib of accumulated fibres was left in the sliver at those parts, which thicknesses, in the after process of spinning, produced an unevenness in the yarn. This defect in the preparation of the sliver it is the object of the present patentees to correct, by a re-arrangement of the mechanism employed in drawing the sliver.

In Plate XV., fig. 1, represents, in vertical section, an improved arrangement of the mechanism of a drawing-head, that is, the operative parts of a drawing or roving frame, by which the fibres of flax, hemp, or tow, are opened, drawn out, straightened, and equalized, preparatory to being converted into rovings, or spun into yarns. The stand or frame of cast-iron *a, a, a,* carries the machinery, consisting of the retaining-rollers, which hold the sliver—the drawing-rollers, which elongate the sliver—and a small cylindrical heckle or roller with needle points, for arresting the fibres of the sliver in its progress through the drawing-machinery. Two rollers *b,* and *c,* driven by toothed gear, conduct forward the sliver of fibrous materials *d, d,* supplied from a carding-engine or from a can, in the ordinary way. A heavy back pressing-roller *e,* bears upon or against the two conducting-rollers *b, c,* for the purpose of pinching and holding the sliver that passes partially round them. This roller *e,* is unconnected with any gearing, and is turned upon its axis merely by friction from its contact with the rollers *b,* and *c.* The roller *c,* is called the retaining-roller, because, at the pinch or point of contact between it and the heavy back-pressing roller *e,* the "reach" commences from whence the fibres of the sliver are drawn. The drawing-roller is shewn at *f,* and upon its periphery the front pressing-roller *g,* is made to bear heavily, by the force of a powerful spring or weighted lever, acting upon its axle, as at *h, h,* whereby the sliver is tightly pinched between them. A small cylindrical gill *i,* or roller with needle points, is placed as near as possible to the bite between

the drawing-rollers *f*, *g*, for the purpose of insinuating its points between the fibres as the sliver passes through the drawing process. These several rollers are driven much in the ordinary way of actuating drawing machinery; but, for the better illustration of the improved arrangement of drawing and roving machinery, it may be desirable to say, that the driving-power is communicated from the first mover to the shaft of the front drawing-roller *f*, and from thence, by toothed gear, a diminished rotary motion is given to the retaining-rollers *c*, and *b*; the latter, *b*, moving with a slightly inferior speed to *c*, for the purpose of keeping the sliver in tension: the pressing-rollers *g*, and *e*, turn independently by the friction of their surfaces against the rollers on which they bear. The gill-roller *i*, is also driven by the connected gear with a rotary motion, somewhat slower than the progressive movement of the sliver, and in the same direction, by means of which the fibres are retained until they are taken hold of and drawn out of the gill-points by the drawing-rollers.

The patentees state, that as it may be desirable in some cases to conduct the sliver of material over the upper surface of the gill-roller *i*, and in other cases under that roller, they in the former instance place the guide-roller (which leads the sliver) in the situation shewn at *k*, in fig. 1; the sliver passing under it and over the gill-roller;—in the other case, the guide-roller is placed lower, as shewn by dots, and the sliver of material passes over it, and under the rotary gill; the gill-roller, in the latter instance, having its heckle-points inclined in the reverse direction to that shewn in the drawing.

From the foregoing it will be understood that the particular feature of novelty in the drawing and roving machinery is, the introduction of a small rotary gill or roller, having heckle-points, in the immediate vicinity of and behind the bite of the front drawing-rollers, by which the fibres of the sliver may be held as near (if not nearer) to the bite of the drawing-rollers as in any of the best constructed screw-gills, and by a more simple working machinery than has heretofore been employed to obtain such an object.

In the event of operating upon materials which have fibres

of considerable length, the patentees propose to introduce one or more additional gill-rollers, as shewn in the auxiliary fig. 1*.

The second feature of the invention applies to the roving-frame, and in some instances to the spinning-machine, and is designed for giving regulating motions to the bobbins, suited to the winding on or filling of them with the rovings or yarns in accordance with the delivery of the drawing-rollers and the increasing diameters of the filling bobbins. This object has been heretofore effected by a driving-band, passed round a conical pulley, connected with a rack and apparatus well understood as a part of the ordinary roving frame.

Fig. 2, represents, in elevation and partly in section, a portion of the back of a roving-frame, shewing the improvements adapted thereto; and fig. 3, is a transverse section of the same, taken vertically in the dotted line A, B, of fig. 2, looking toward the right-hand. The standards and general framing are marked *a, a, a,* and support the horizontal roller-beam *b, b.* The driving-shaft *c, c,* carries the twist-pinion *d,* as usual; from whence, by a train of intermediate wheels, the drawing-rollers are actuated in the ordinary way, and also the back-shaft *e,* that heretofore carried the sliding-pulley, by which the ordinary differential cone was driven. Now, in place of the ordinary differential cone, its pulley, and other appendages, an apparatus is employed, which is to be driven by the back-shaft *e,* through the agency of a mitre-wheel *f,* fixed at the inner end of the back-shaft; which wheel *f,* takes into two corresponding mitre-wheels *g,* and *h.* The mitre-wheel *g,* is made fast upon an upright shaft *i,* to which a disc-plate *k,* is affixed; and to the socket of the other mitre-wheel *h,* is attached an upper similar disc-plate *l*; which plate, with the wheel *h,* turns loosely upon the shaft i. Hence, it will be seen, that by the rotation of the mitre-wheel *f,* the disc-plates *k,* and *l,* will be made to revolve in opposite directions. These two discs, having smooth internal surfaces, are designed, as they revolve, to give rotary motion, by means of friction, to a vertical wheel or bowl *m,* the periphery of which will be always in contact with the inner faces of the discs *k,* and *l.* This friction-bowl *m,* is fixed upon the end

of a horizontal shaft *n*, capable of sliding longitudinally through the socket of a pinion *o*; which pinion is made to revolve with the shaft *n*, by a rib or feather, which locks them together. The socket of the pinion *o*, turns in a plummer-block, fixed to one of the standards, and is so situate that, as it revolves, the pinion *o*, actuates the ordinary train of wheels *j*, *j*, which give motion to the spur-wheel in the differential box *p*, *p*, placed upon the driving-shaft for purposes well understood by spinners. The shaft *n*, *n*, carrying the friction-bowl *m*, is mounted and turns between its shoulders or collars in a plummer-block *q*, fixed in the face of a sliding-plate *r*, *r*; which sliding-plate is moveable longitudinally in dovetailed grooves (see fig. 3,) in the horizontal frame *s*, *s*, affixed to the standards;—both of which are shewn, partially broken away, in fig. 2. To the sliding-plate *r*, *r*, a rack-piece *t*, is attached by bolts; and a pinion *u*, fixed on a transverse axle *v*, mounted on the stationary frame *s*, takes into this rack *t*; so that, by the rotation of the pinion *u*, the rack *t*, and sliding-plate *r*, *r*, are moved longitudinally, and with them the plummer-block *q*, which slides the shaft *n*, along in the socket of the pinion *o*, and thereby moves the friction-bowl *m*, on to a smaller radius of the friction-discs *k*, and *l*; consequently the rotary speed of the shaft *n*, (driven merely by the friction) with its pinion *o*, becomes reduced, and the rotary motion of the differential-box *p*, *p*, is varied accordingly.

It will be unnecessary to describe the construction and use of the differential-box *p*, *p*, as it is commonly adapted to roving and spinning-machines; but it is necessary to explain more particularly the way in which the escapement apparatus for controlling the rotary motion of the differential-box is constructed. Upon the transverse shaft *v*, there is affixed a pulley *w*, from which is suspended, by a chain, a heavy weight *x*; this weight has a constant tendency to draw the pulley *w*, and shaft *v*, round in that direction which would cause the pinion *u*, to drive the rack *t*, with its sliding-plate *r*, toward the right-hand of fig. 2, and, in doing so, to shift the situation of the bowl *m*, from the larger to the lesser radius of the friction-discs *k*, and *l*. In order therefore to

prevent this running down of the weight, an escapement apparatus is mounted in the front part of the machine, consisting of a ratchet-wheel *y*, with clicks taking into its teeth; which clicks are raised occasionally, for the purpose of letting off the escapement one tooth at a time. Fig. 4, represents a portion of the front part of the machine, in which the ratchet-wheel *y*, is more distinctly seen, with the clicks and the means employed for releasing them. The clicks 1, and 2, hang upon studs, set in a plate or bracket-piece *z*, fixed to the under part of the roller-beam. The point of the upper click 1, falls by its own gravity into the teeth of the ratchet-wheel *y*; the point of the lower click 2, is held up in the teeth of the ratchet-wheel by a weight 3, pendant from the tail of the click. By these clicks holding the ratchet-wheel, the running down of the weight *x*, and the running in of the rack *t*, and bowl *m*, is prevented, as before said. A perpendicular rod 4, 4, 4, sliding in sockets at top and bottom, has two slots cut through it, to receive each a pin, set in the side of the clicks 1, and 2. The ends of these slots acting against the pins in the studs will, on the rod 4, being raised, cause the click 1, to be lifted out of the ratchet, and, on the rod 4, descending, cause the click 2, to be drawn out of the ratchet; thus producing the escapement. The sliding movements of the perpendicular rod 4, are effected by the rotation of a pinion 5, fixed at the outer end of the ordinary mangle-wheel shaft 6. This pinion takes into a vertical rack 7, bolted to a slider 8; which slider carries a bracket-arm 9, and moves up and down in a groove, formed in an upright standard 10. On the pinion 5, upon the mangle-wheel shaft, raising the rack 7, and slider 8, the bracket-arm 9, will be brought against the under side of the upper stop 11, fixed upon the perpendicular shaft 4; and the shaft will, by that means, be lifted, and, consequently, the click 1, raised out of the ratchet; thus allowing an escapement of one tooth;—on the rack 7, with the slider 8, being brought down by the contrary rotation of the pinion 5, on the mangle-wheel shaft, the arm 9, will come in contact with the lower stop 12, upon the shaft 4, and, by depressing that shaft, draw the click 2, out of the ratchet, and allow the escape of another tooth of the ratchet-wheel.

Thus, in connection and simultaneously with the ordinary traverse or copping movements of the machine, the bowl *m*, will be slidden from the larger to the lesser radius of the friction-discs *k*, and *l*, as before described; and the speed of the differential-wheels *p*, *p*, will be varied in accordance with the increasing diameter of the bobbins, as they become filled with yarn.

The last part of the invention is designed to effect a permanent adjustment of the upright spindles of a spinning machine in their sockets or collars, and consists in the adaptation of peculiarly constructed sockets or collars, inserted into the collar-rail, by means of which, the collars being once adjusted to the spindles, the machine may be taken to pieces and put together again without requiring any re-adjustment of the collars to render the rotary action of the spindles perfectly true.

Fig. 5, in the accompanying drawing, represents, in elevation, an ordinary spindle *a*, *a*, with its flyer and warve; *b*, is the step-rail below, in the step of which the lower end of the spindle turns; *c*, is the socket-rail or collar-rail; and *d*, *d*, is a tube, forming the collar or socket in which the spindle revolves: this tube or collar is inserted into the rail *c*, a horizontal representation of which rail is shewn at fig. 6. In the upper surface of the rail a longitudinal groove *e*, *e*, is cut, and the flange of the collar *d*, is flattened on each side to fit accurately into this groove, for the purpose of preventing the tube turning round or altering its situation in the collar-rail; and the point of a small screw, passed through the rail, is inserted into the side of the tube, to prevent its rising. When these tubes or collars have been thus let into the rail, and properly adjusted to the spindles, they are severally marked, and a corresponding mark is made upon the rail; so that, being at any time removed from the rail, they may be replaced according to their corresponding marks, and will be found to be as accurately adjusted to the spindles, as when the machinery was originally perfected.

The patentees claim, Firstly,—the introduction into drawing, roving, and sometimes spinning machinery, for flax, hemp, and tow, of one or more small rotary gills or rollers,

having heckle-points set in metal or other rigid substance; one of which rotary gills or heckle-rollers shall act in the immediate vicinity of and behind the bite of the front drawing-rollers, for the purpose of partially holding the fibres of the sliver of flax, hemp, or other material to be drawn therefrom. Secondly,—the adaptation of a friction-wheel or bowl between two revolving friction discs or surfaces, for the purpose of regulating the winding on of the rovings or yarns of various fibrous materials upon bobbins, through the intervention of the differential apparatus above described. And, Thirdly,—the form and adaptation of the tubes or sockets in which the spindles for spinning various fibrous materials turn; and the mode of their insertion into the planed parallel groove of the collar-rail, by means of the parallel flatted edges of their flanges, as above set forth.—[*Inrolled in the Petty Bag Office, April,* 1847.]

Specification drawn by Messrs. Newton and Son.

To Edward Hammond Bentall, *of Heybridge, in the county of Essex, ironfounder, for improvements in implements for ploughing land, and clearing land of weeds.*—[Sealed 23rd July, 1846.]

This invention of improvements in implements for ploughing land, and clearing land of weeds, consists, firstly, of improvements on the ordinary plough, whereby the share may be attached to the spit without a bolt or screw; and by an improved mode of securing the mould-board or breast of the plough, the same may be adjusted to suit the depth and width of the furrow with greater facility than by the ordinary method. A further improvement in the ordinary plough is a peculiar mode of mounting the guide-wheels.

The invention consists, secondly, in certain improved arrangements of shares and blades or knives, combined with a forward point, which is intended to enter the ground, and keep such shares and blades or knives up to their work, when the implement is required to cut up hard ground, or is employed for subsoil ploughing. This forward point acts

also as a guide, and prevents the plough from swaying to the right or left, and producing crooked furrows.

Thirdly, the invention consists in so attaching the wooden and metal beams of ploughs to the frame, that any ploughman may readily adjust the beam either to the near side or off side, or raise or depress the beam, to make the plough work more or less free, as required.

In Plate XVI., fig. 1, represents in elevation an ordinary plough, with the improvements applied thereto; and fig. 2, is a plan view of the same. *a, a,* is the frame of the plough, attached to the beam *b,* in the ordinary way; *c, c,* is the mould-board or breast, affixed at its upper part, by an adjustable weigh-pin *d,* and screw, to the frame *a,* and provided at its lower extremity with a knob or projection, which is inserted into a hole or socket in the spit *e,* of the frame that carries the share *f.* By referring to fig. 2, it will be seen that the adjustable weigh-pin *d,* consists of two parts; one part being bolted to the breast, and the other to the frame. That part which is fixed to the frame is provided with an eye-bolt, to receive the end of the pin, which is fixed to the breast; and by means of a nut on its upper end, this eye-bolt is made to hold the pin securely in its place. Figs. 3, represent in plan, edge views, and section—the share detached. It is provided with flanges 1, 1, which form a socket to receive the spit; and there is a lip 2, to this socket, which covers the end of the spit. Through this lip, and also through the end of the spit, a hole is made for the insertion of a peg, which is intended to hold the share on the spit without any other fastening. The socket of this share is somewhat similar to a shoe; for it is so constructed that the bottom or sole 3, of the socket shall protect the spit from the wear it might otherwise be subject to in passing through the soil. At figs. 4, the share is shewn as attached to the spit *e*; and the knob 4, at the end of the breast or mould-board, is shewn. This knob is inserted into the hole 5, of the spit, and when the weigh-pin *d,* (which constitutes, together with the knob, the only fastening for holding the breast in its place) is required to be adjusted to move the breast to its proper inclination, the breast will rock

sufficiently in its socket in the spit *e*, to allow of such adjustment, whereby great simplicity is attained in fixing the breasts of ploughs. In order to prevent the mould-board or breast from rising out of its socket, the lip 2, is made to partially cover the socket-hole 5, (see fig. 4,) and thereby abut upon the end of the breast when the share is fixed on the spit.

The novel mode of mounting the guide-wheels of the plough is shewn at figs. 5, and 6, and also at figs. 1, and 2. *h*, is a block, attached by a cross-bar *i*, to the beam in the following manner:—The bar *i*, passes through the beam and through the stay *k*, that assists in supporting the head of the plough, and also through an eye-bolt 6, which, passing through the middle of the block *h*, is attached thereto by a nut at its upper end. In this block *h*, and on either side of the eye-bolt 6, a hole is made to insert other eye-bolts 7, 7, which are intended to receive the horizontal bars 8, 8, provided respectively at one end with socket-pieces; and when the eye-bolts 7, are screwed up by their nuts, these bars will be firmly secured to the block *h*. In the socket-pieces of the bars 8, vertical bars 9, (which, at their lower end, carry the guide-wheels, and at their upper end, the scrapers for those wheels) are secured by screws. When the head of the plough is required to be depressed, these screws are loosened, and the socket-pieces are slidden down the vertical bars 9, to the desired distance; the screws are then tightened, and the plough is ready for use;—but if one or both of the guide-wheels are required to be moved laterally, this may be done by loosening the nuts of the eye-bolts 7, and then the horizontal bars 8, may be adjusted at pleasure. The scrapers, it will be seen, in either case, will retain their proper position over the wheels. By this arrangement it will be evident that the guide-wheels may be easily dismounted and removed, when not required to be used;—for to effect this, it is only necessary to unscrew the nut on the eye-bolt 6.

The second part of the invention consists, as before stated, in certain arrangements for producing a subsoil and broad-share-plough, as shewn in elevation at fig. 7, and in plan view at fig. 8. *a, a*, is the frame, attached to the beam *b*,

which carries the head and handles of the plough; *c, c,* are arms attached on each side of the beam by bolts, and intended to carry the broad-shares *d, d.* To these arms are also affixed brackets *e, e,* provided with slots to receive vertical bars, in the lower ends of which the wheels *f, f,* are mounted. At the forward end of the frame *a,* a subsoil-point *g,* is affixed, which point is intended to enter the ground at any required depth, and keep the broad-shares or other cutting-edges steady to their work. The broad-shares *d, d,* are similarly provided with forward points, which loosen the earth, and allow the shares to enter more readily, as will be well understood. At the back part of the frame *a,* a broad-share *h,* is bolted;—this share is seen best in the detached view at fig. 9, which represents the frame in sectional plan view, with the subsoil-point *g,* also attached; and through the frame *a,* at about the middle of its length, two slots are formed at different heights, to receive two horizontal blades or knives *i, i,* which are secured in their places by wedges, and are employed only when the plough is used for subsoiling. The arrangement of the implement, when this operation of subsoiling is required to be effected, is as follows:—The arms *c, c,* with the broad-shares *d, d,* and the wheels *f, f,* are removed, by unscrewing the nuts that attach the arms *c,* to the beam; and, in place of the broad-share *h,* a share, the ends of which project the same distance as the blades *i, i,* is affixed to the frame *a.* The subsoil-point *g,* first enters the ground, and cuts the lowest depth; the share *h,* then cuts the earth at about three inches above the subsoil-point *g,* and the blades *i, i,* take the earth at about three and six inches respectively above the share *h.* By this means, with an implement of the ordinary size, subsoiling from about nine to twelve inches may be readily effected. In some cases it may be necessary to remove one of the blades *i,* when the draught is too great, either from the dryness or wetness of the soil. This, however, must be left to the judgment of the ploughman; and the length of the blades may be also greatly varied; for, in light soils, they may be used, say twelve inches long, although for the ordinary kinds of land, a length of six inches may be considered sufficient. When this im-

proved arrangement of plough is required for clearing the land of weeds, or of stubble after harvest, the blades *i*, *i*, are removed, by knocking out the wedges, and the arms *c*, *c*, are attached to the beam, as shewn in the drawing; the broad-shares *d*, *d*, are then secured to the arms *c*. On the upper angles of these arms *c*, a V-edge is provided; and on that side to which the broad-shares *d*, are attached, such edge is intended to take into one of a series of horizontal V-grooves in the back of the stalks *k*, *k*, which carry the shares *d*, at their lower end. The front of these stalks is also provided with grooves, for the purpose of receiving a clasp *l*, which attaches them respectively to the arm *c*. When, therefore, it is found requisite to adjust the height of the stalks, these clasps are shifted into an upper or lower groove, as the case may be, and the V-edge on the arms is made to enter a groove on the stalk to suit such adjustment. The clasps are then respectively screwed up by their nuts, and the stalks are thereby firmly attached to the arms *c*. To the under surface or edge of the stalks the broad-shares *d*, are bolted; and at the forward end of each of the stalks a point *m*, is secured by a peg or otherwise. The wheels *f*, turn, as before stated, in the lower end of vertical bars, and these bars are connected to the brackets *e*, *e*, by eye-bolts. The brackets *e*, are firmly attached to the arms *c*, by bolts, which pass through their inner ends and through the arms *c*. When the plough is thus arranged, and the beam is adjusted, by means of the guide-wheel *n*, to the required height, the surface of the earth may be broken up with great expedition; and if the soil is light, and the shares are not required to enter deep into the earth, the stalks *k*, may be slidden to the end of the arms *c*, and broader shares may be used, so as to act upon a greater width of land at one traverse of the plough. It will now be understood, that this implement is capable of various modifications, to suit a variety of purposes; but when it is intended only for surface work,—that is, removing stubble, &c., the patentee proposes to employ three stalks *k*,—the middle one being placed forward, with its point under the plough-beam, in the same position as the subsoil-point *g*. By this arrangement, in place of the frame *a*, the third stalk

is substituted, which, being bolted to the beam, in any convenient manner, will form a cheaper implement, but limited in its applicability for work.

The last part of the invention refers, as above stated, to the adjustment of plough-beams; and consists in the application of collars and screw-bolts. Fig. 10, represents a portion of a cast-iron frame *a*, with a wooden beam *b*, attached thereto by bolts 1, and 2. The hole in the frame, through which the bolt 1, passes, is lengthened cross-ways of the frame (see the plan view, fig. 10*); and on this bolt 1, between the beam and frame, are collars, one or more of which, when the head of the plough is required to be raised, is removed, and the nut of the bolt is tightened up; but if the plough-head is required to be depressed, one or more collars must be added. In order to adjust the beam to the near side or off side, the bolt 1, is loosened, and the beam is slidden either to the right or left of the slot in the top of the frame. Figs. 11, shew the mode of securing the beam in its position. 3, is an ear, cast on the frame *a*, and furnished with a vertical slot; through this slot, and through the beam *b*, a bolt 4, provided on the near side of the beam with collars, passes; and by adding to, or taking from, these collars the beam may be adjusted laterally; the bolts are then tightened up as before. By this means, the adjustment of the beam can be made by the ploughman, instead of sending the plough to the maker, as is ordinarily the case.

The patentee remarks, that with respect to the share, shewn and described under the first head of the invention, he is aware of shares having been made with a flat piece or shield to protect the end of the spit from friction while passing through the ground; but when such shield has been used, the share has been attached to the spit by a bolt. He is likewise aware that shares have been attached to the spit, by fitting in a socket; but, in such case, no protection was given to the spit, and, therefore, the advantage of a ready attachment was counterbalanced by the destructive wear on the end of the spit. He does not, therefore, intend to claim singly protecting the spit from wear, by the application of a shield, which forms part with the share, nor does he claim

the mode of affixing the share to the spit; but he claims the improved share above described and shewn in the drawings, whereby the two advantages of a ready attachment, and protecting shoe or shield, are combined. Under this head of the invention, he claims, Secondly,—the mode of attaching the breast or mould-board as above described; and, Thirdly,—the mode of mounting the guide-wheels.

Under the second head of the invention, he claims the general arrangement of the parts, as above described, for subsoil-ploughing, and for clearing the surface of the land; and particularly the application to agricultural implements (in which shares or blades for cutting up the soil are used) of the subsoil-point *g*, which precedes the shares or cutting-edges, and, entering the soil to a given depth, keeps the shares or blades steady to their work. He also claims the attaching, on the same frame or stalk, of a forward point and a broad-share, either of which may be removed when injured, to allow of a new share or point being attached; and likewise the arrangement of the broad-share *h*, and blades or knives *i*, *i*, whereby the earth may be cut transversely at different heights, as before explained, when subsoiling.

Under the third head of the invention, he claims the mode of adjusting the beams of ploughs, as described with reference to figs. 10, 10*, and 11.—[*Inrolled in the Petty Bag Office, January,* 1847.]

Specification drawn by Messrs. Newton and Son.

To CHARLES CHINNOCK, *of Seymour-place, Little Chelsea, in the county of Middlesex, Gent., for improvements in folding and securing letters, envelopes, and covers.*—[Sealed 24th September, 1846.]

THE object of this invention is to prevent the surreptitious opening of letters, envelopes, and covers, by applying the ordinary postage-stamp, or some other adhesive label, in such a manner, that the gum or adhesive material on the back of the stamp or label will lay hold of the letter, as well as the external wrapper or envelope, thus keeping the contents

secure, notwithstanding any negligence in the gumming of the edges, or failure of, or tampering with, that part of the fastening, or with the wafer or wax. This is accomplished by several different methods: the first consists in cutting or punching a hole, somewhat less than the size of the stamp or label, through that corner of the front or superscription side of the envelope where the postage-stamp is usually placed, that the stamp, when applied, will lay hold, at the same time, of the edges of the hole, and the turned-in piece, by which the end of the envelope is fastened, and also the note or paper within. The second method, which may be used alone, or in combination with the first method, consists in punching a hole through that part of the envelope where the seal is to be placed, and either placing a small square piece of blotting-paper beneath it, or not, as may be preferred. In the third method, the stamp or label is made to fasten the envelope, and, at the same time, give the additional security to the contents. The patentee states, that a further advantage resulting from the first and third methods is, that the tearing away of a part of either the envelope and stamp, or the enclosure, which is inevitable in withdrawing the enclosure from the envelope, will, by the torn part of the one adhering to the other, furnish evidence that the communication has been transmitted through the post-office.

In Plate XVI., fig. 1, is a back view, fig. 2, a front view of an envelope, and fig. 3, exhibits an envelope open. The dotted lines *a, a,* shew the mode of folding the paper to form the envelope; the sides *b, b,* are turned in and gummed to the sides *c, c.* *d,* is a hole, over which the stamp or label is to be affixed, so as to lay hold of that part of the letter which is beneath the hole, as well as the edges of the hole, and the turned-in edge, shewn at *e,* fig. 2.

The second method of securing the envelope is shewn at figs. 4, and 5; fig. 4, exhibiting the envelope open, and fig. 5, being an enlarged view of the flaps of the envelope fastened together. The dotted lines *f, f,* shew the mode of folding the paper. *d,* is the hole, which is to be made at the corner of the envelope, when a stamp or label is to be used therewith. In each of the flaps *g, h, i,* a hole is formed; that in

g, being the smallest, that in *h*, a little larger, and that in *i*, still larger; and when they are gummed or fastened down, *g*, is undermost, *h*, the next, and *i*, the uppermost one; so that the wafer or wax will secure each flap, and also the letter or note within the envelope; any attempt, therefore, to disturb it, cannot fail to be discovered. Sometimes a small piece of blotting-paper is placed loosely on the note or paper, beneath the holes, as shewn in figs. 1, and 3, at *j*. This piece of paper becomes attached to the wax or wafer; and it will be found, that the blotting-paper must be drawn through the holes, tearing the holes, or being itself torn, before the letter can be opened. When an adhesive label is used, a hole must also be punched in the flap *k*, larger than either of the others.

The third method is shewn at figs. 6, 7, and 8. The dotted lines indicate the manner of folding the paper. The flaps *l*, and *m*, being turned in, the part *c*, is brought over on to the part *d*; and, being gummed or fastened, forms the pocket or envelope, the mouth of which is at *e*. The flap to the envelope being prepared with gum, is moistened, and brought down over the mouth, to secure the letter; the stamp or label is then applied over the corner of the flap *e*, and on the hole *g*, whereby the whole is effectually secured, as shewn at fig. 7.

The patentee claims the methods, hereinbefore described, of applying a postage-stamp or other like adhesive label to give additional security to envelopes, despatches, letters, and covers; and also the methods of securing such envelopes and covers, by applying holes of different sizes, with or without the use of a small piece of paper under the same, to the sealing place, as above described.—[*Inrolled in the Rolls Chapel Office, March,* 1847.]

To George Russell Dartnell, *of Chatham, in the county of Kent, staff-surgeon to Her Majesty's forces, for an improved truss for inguinal hernia.*—[Sealed 24th February, 1847.]

In Plate XV., fig. 1, is a front view of the improved truss; fig. 2, is a back view thereof; and fig. 3, is a separate view

of the rupture pad. It consists of a short steel-spring *a*, two pads *b*, and *c*, attached to the spring at either end, and a leathern strap *d*. The spring *a*, varies in length from sixteen to eighteen inches,—is japanned to prevent rust, and covered with a sheath of leather; it is curved downwards at its anterior extremity, so as to bring the pressure of the pad *c*, upon the internal inguinal ring, and inguinal canal. The back pad *b*, is formed of strong leather, lined with chamois or soft buckskin, and it is attached to the spring by two bridles, which are so made as to admit of the pad being moved and readily adjusted to its proper position on the back: it is of an oblong or oval shape, and about two and a half inches in length by one and a half in breadth. The anterior or rupture pad *c*, is solid, formed of hard wood, and polished; it is of an oval conical shape, rounded on the inner face, and, if preferred, may be covered with a cap of chamois leather; it is fixed to the anteroir extremity of the spring by two screws. The strap *d*, which is of soft buckskin, and is continuous with the sheath of the spring, serves to keep the instrument in its place, and is passed round the opposite hip, and looped to a button-screw on the anterior pad.

The main principle of action of this truss consists in the pressure of the anterior or rupture-pad on the internal ring and inguinal canal; but the patentee does not claim that as any part of his invention. The improvements consist in carrying this principle into effect by a more simple and less expensive mode than that hitherto adopted, by reason of the small size and conical shape of the anterior or rupture-pad, and the manner in which it is fixed to the spring, without any secondary spring, socket-joint, or other means of self-adjustment; also in forming the anterior or rupture-pad of hard wood, solid, polished, and non-absorbent of perspiration; in making the bend of the anterior extremity of the spring shorter, and curved more directly downwards than the springs of ordinary trusses; in the material, shape, and ready adjustment of the back pad; and in the general simplicity, lightness, and durability of the whole instrument.

The double truss is nothing more than the union of "a right and left-sided instrument;" the posterior extremities

of the springs sliding one over the other within the leathern sheath; and the flat pad being placed in the centre, and a strap and buckle attached to the sheath, in such a way as to admit of the springs separating or closing on one another,—thus increasing or diminishing the length of the instrument.—[*Inrolled in the Rolls Chapel Office, April*, 1847.]

To ALFRED VINCENT NEWTON, *of the Office for Patents*, 66, *Chancery-lane, in the county of Middlesex, mechanical draughtsman, for an invention of improvements in the method of heating, hardening, and tempering various articles made of steel, or of iron and steel combined,—being a communication.*—[Sealed 24th September, 1846.]

THIS invention consists in the construction and application of certain apparatus, which is intended to ensure the proper heating of articles required to be hardened or tempered. The apparatus represented in the drawings accompanying the specification was designed principally for the heating, hardening, and tempering of axes; but, under proper modifications, which will readily suggest themselves to any competent workman, every variety of article, requiring to be submitted to such processes, may be treated according to this invention.

For heating axes or other similar articles, a heating-furnace is constructed, in the form of a vertical cylinder. The exterior of this cylinder may be made of sheet-iron, say four feet eight inches in diameter, or varying therefrom in such a degree as shall give to its interior a diameter of four feet, when lined with fire-brick;—its height may be about three feet. In the interior of this cylinder several fire-chambers are formed, the number of which is usually four, dividing the circle of brick-lining into eight equal parts, so that there shall be a space of fire-brick between each of the fire-chambers. The inner wall of each fire-chamber is formed by a circle of three feet four inches in diameter; each of the fire-chambers is therefore about eighteen inches long, about four inches from front to back, or from one of its circular sides to the other, and it may be about four inches also in depth;

the ends of each of the chambers may be parallel, or nearly so. Under each there are grate-bars, and air is supplied to them through a pipe, connected with a blowing apparatus.

A circular table, usually of cast-iron, three feet four inches in diameter (which is the same with that of the interior circle of the fire-chambers), is made to revolve slowly on a level with the upper part of the said chambers. This table is sustained on a central shaft, which passes down through the bottom of the furnace, and has its bearing in a step below it; a pulley, keyed on to this shaft, serves to communicate rotary motion to the table.

When the axes or other articles are to be heated, they are placed upon the table with their bitts or steeled parts projecting so far over its edge as to bring them directly over the centre of the fire; and the table, on which they are thus situated, is kept slowly revolving during the whole time of heating; the time required being governed by the size of the article under operation. When duly heated, they are ready for the process of hardening.

The hardening bath consists of a circular tub or vat, wherein the hardening liquor (usually composed of water containing salt) is placed. Within this tub or vat, a little above the surface of the liquid, is a wheel, mounted horizontally, and made to revolve by means of a band and pulley. Around the periphery of this wheel a number of hooks or pins are provided, upon which the axes or other articles are to be suspended as they are taken from the furnace; the height of these pins from the liquid is such as will allow the lower part only, or bitt, to be immersed therein. The temperature of the hardening liquid is kept down by having a large reservoir thereof in the ground below the tub or vat; from which reservoir fresh liquor is pumped into it, as required; and that which has been heated is allowed to flow back again into the said reservoir, which, being a few feet below the surface of the ground, and of considerable capacity, preserves the liquor at a sufficiently low temperature. As soon as the hardening of the steeled portion is effected, the axes or other articles are removed from the hooks or pins, and the heads are cooled by dipping them in cold water.

In Plate XV., figs. 1, and 2, represent, in perspective views, the furnace and the hardening tub; fig. 3, is a plan view of the interior of the furnace, the upper part or top plate thereof being removed; and fig. 4, is a vertical section, taken in the line * * of fig. 3. A, A, is the furnace; B, B, are the furnace-doors, through which the fires are fed, and the articles to be hardened are adjusted; C, is the chimney for carrying off the gases of combustion; D, the pipe for supplying air to the fire; E, E, the fire-chambers; F, the revolving table, upon which the axes or other articles to be heated are placed; and G, is a vertical shaft, provided with a winch-handle, and carrying a pulley H, which, by means of an endless band I, communicates rotary motion to the pulley on the shaft which supports the table F, and thus causes it to revolve.

J, fig. 2, is the hardening-tub; and K, is a wheel, mounted horizontally in the tub J, and furnished, on its periphery, with pins or hooks *a*, *a*, upon which the axes or other articles are to be hung. This wheel may be kept revolving by means of an endless band L, passing around a pulley M, on the shaft G, and also round a pulley on the shaft of the wheel K.

It is well known to persons intimately acquainted with the manufacturing of edge-tools, that the most difficult part of the operation of hardening and tempering is giving a uniform and proper degree of heat to the piece to be hardened. The exact degree of heat to be given will, it is true, vary according to the nature of the steel to be operated upon,—as what is called high steel will require to be less highly heated than that known as low steel; the experience and judgment of the operator being the only guide in this particular. But, whatever be the quality of the steel, the equal heating of all its parts is of the utmost importance; and in articles of any considerable size this cannot be effected in the ordinary mode of procedure with an open fire. Where articles are unequal in thickness, as is usually the case, the difficulty is much increased; but even where the thickness is equal the difficulty is not removed. When the articles to be heated are placed over an open fire, one side of the steel is exposed to its action, and the other, in a greater or less degree, to that of the at-

mosphere, and the utmost care and skill cannot entirely overcome the unequal heating resulting therefrom.

In the apparatus which forms the subject of this invention, it is stated, that all parts of the steel may be equally exposed to the action of the fire, the intensity of which may be increased as the articles become heated, and all danger of heating the thin more highly than their thicker parts is removed; they are, consequently, equally expanded in all their parts, and the danger of producing cracks or other injurious effects from unequal contraction in hardening, which often destroys the tools, does not exist.

It has been already stated that the apparatus, as herein described, is so formed as to adapt it to the heating and hardening of axes. To these the table F, is particularly adapted; but, for the support and exposure of other articles to the action of the fire, the outer edge of the table must be furnished with devices adapted to them in a manner that will occur to any competent workman.

The improved method of tempering articles manufactured in whole or in part of steel, is similar to that above described for heating such articles for hardening, and consists in submitting them, for a sufficient length of time, to an atmosphere or bath of heated air, which is to be brought up to, and kept at, the temperature required for the tempering, and which will vary according to the nature of the steel employed, and of the tool or other article to be tempered. To effect this object the inventor constructs an oven, which may be formed of iron or other material; and with this oven a furnace and air-flues are so connected and arranged that the air contained in the oven may be as highly heated as is deemed necessary, whilst its temperature can be regulated by the introduction of cold air at any time. For the purpose of ascertaining the temperature of the oven, a thermometer is employed, the bulb of which is to be exposed to the action of the air contained in the oven. The articles to be tempered may be placed on a carriage or wheel, which may be made to revolve or move within the oven; the air will, by this means, be in some degree agitated, and the articles to be operated upon will be made to occupy different parts of the oven. A device of this

kind may not be absolutely necessary, but it is undoubtedly useful and convenient.

Fig. 5, represents, in perspective view, an oven and furnace intended for the tempering of common axes, but which will also serve for edge-tools, swords, and cutlery of all kinds; and fig. 6, is a vertical cross section of the same. N, is the oven set immediately above the furnace O, the heat from which passes through the flue-space P, P, surrounding the oven; Q, is the escape-flue for the heated gases; R, is an open tube leading from the interior of the oven to the external air, and through this a thermometer is passed in such a manner that its bulb shall indicate the temperature of the air within the oven; S, is a thermometer placed within this tube; T, is a blast-pipe, through which air is to be conveyed to the ash-pit of the furnace from any convenient blowing-apparatus, and from this the tube U, leads into the ash-pit to supply the air necessary to combustion. V, is a tube leading also from the tube T, into the oven; and through which cold air may be blown, when the temperature of the oven is to be reduced; or the same may be effected by other modes, as by the opening of the door, which has been found sufficient in practice. The tubes U, and V, are furnished with stop-cocks, to regulate the passage of air through them. This mode of tempering will apply equally to tools which have been hardened, whatever may be the process of hardening. W, is a horizontal-wheel fixed on an axis X, and made to revolve by means of bevil gearing, as shewn at Y; the axis and winch *z*, serving to communicate the desired motion. *b*, and *c*, are bars placed within the oven, and made fast to its ends to sustain its axis X.

When axes are to be tempered, they are passed into the oven through the door-way, and placed on their heads, around the wheel W, which may be furnished with projecting pins, to keep them in their place. When properly arranged on the wheel W, the door is closed, and the wheel is made to revolve slowly. During the operation there will be a continuous current of air passing out through the tube R; which current will cause the thermometer, contained in the tube, to shew the exact temperature of the air within the oven. With the

best cast-steel, a temperature of 510° of Fahrenheit's scale has been found to produce a perfectly good result in the tempering of axes; and the time required to bring them up to this degree of heat is about 45 minutes. For smaller articles, less time will be required, and that in proportion to their substance. The inventor states that no injury has been found to result from keeping the articles longer in the oven than is actually necessary, when the temperature was maintained at the same degree; a thing in which there is not the slightest difficulty under the foregoing arrangements. It will be manifest also that the temperature of the oven may be graduated, so as to suit high or low steel, as well as to adapt it to the degree of hardness required in the articles operated upon. This process is entirely free from the uncertainty resulting from the test of color so generally relied upon; and also from the varying fusibility of metallic alloys which have sometimes been used for tempering.

The oven, as above described and represented in the drawing, is constructed of iron, and for those of a small size it may be best to form them of this material; but they may be constructed also in whole or in part of brick or stone, which are bad conductors of heat; and their form may be varied in any convenient manner. If built entirely of bricks, or other bad conductor of heat, it may be found advisable to introduce heated air, by means of air-tubes passing through the furnace, as well as to provide the means of introducing cold air: this and other changes in the arrangement of the parts may be made according to the choice or judgment of the constructor.

The patentee claims, First,—the manner herein set forth of constructing the heating-furnace with an enclosed fire, and having four or any other convenient number of fire-chambers, arranged circularly around or under the top of a table, which is adapted to receive the articles that are to be heated upon it, and which is made to revolve during the time of heating, substantially in the manner and for the purpose herein set forth. Secondly,—in combination with the heating-oven, the apparatus herein described for hardening the article thus heated; the said apparatus consisting of a revolving wheel situated above the surface of the hardening liquid,

which wheel is furnished with pins, hooks, or other devices, suited to particular articles to be operated upon; the whole being arranged substantially as described. And, Thirdly,—the manner herein set forth of tempering articles, formed in whole or in part of hardened steel, by the action of air, heated to the requisite temperature within an oven by means of a suitable furnace; which oven is provided with the means of ascertaining and regulating the temperature of the air, as described.—[*Inrolled in the Petty Bag Office, March,* 1847.]

Specification drawn by Messrs. Newton and Son.

To Etienne Abram Maccaud, *of No.* 1, *Place de la Madeleine, Paris, mechanician, for improvements in lamps and gas-burners.*—[Sealed 22nd October, 1846.]

This invention consists in surrounding the lower part of Argand burners with a casing, having numerous minute apertures in it, or made of any suitable open tissue, through which all the air to support combustion, both that which passes upwards through the centre of the flame and that which acts upon its exterior, is compelled to pass. By this arrangement no jets or partial currents of air can affect the flame, as the air is drawn, by the action of the flame, in minute streams from all parts of the circumference of the casing; and in its passage through the casing the temperature of the air is raised, so that the casing becomes a reservoir of hot air; and as the combustion is supported by the air from the reservoir only, a steady white flame is obtained.

In Plate XV., fig. 1, is a vertical section of an Argand gas-burner, with this invention applied thereto; and fig. 2, is a plan view of the same. *a*, is the burner; *b*, is a casing of wire-gauze, of one thousand meshes to the square inch, connected at the upper end to the chimney-gallery *c*, and having affixed to the lower end a ring, which rests in a cup *d*, attached to the stem of the burner; *e*, is an annular passage, made in the plate of the gallery *c*, (which forms the top of the air-chamber), for the purpose of admitting air into

the space between the chimney and the exterior of the flame. The chimney is fitted accurately into the gallery, so that no air can pass between its lower edge and the plate on which it rests; and the ring at the bottom of the casing *b*, is kept in close contact with the cup *d*, so as to prevent the passage of air at that part. Instead of the chimney-gallery consisting of a solid plate, with an annular opening in it, an annular piece of wire-gauze may be fixed over the space between the exterior of the burner and the casing.

The patentee states, in conclusion, that he claims the application to lamps and gas-burners, of the kind called Argand (that is, burners having a channel for the passage of the air to the interior of the flame), of a hot-air chamber or reservoir, composed of wire-gauze, or of other tissues or materials, adapted to allow the passage of air to the flame in a minutely subdivided or diffused state; through which chamber the air is compelled to pass before it can act upon either the interior or exterior surfaces of the flame;—the improvements consisting, First,—in enclosing the whole of the space between the outer rim of the gallery or glass carriage and the bottom of the forked stem of the burner, so as to form but one chamber or reservoir for the supply of air to the burner; and, Secondly,—in admitting the air through wire-gauze, or otherwise, in such a subdivided or finely-diffused state into the said chamber, as to prevent any air, in the form of a jet, acting upon the flame.—[*Inrolled in the Inrolment Office, April*, 1847.]

[The patentee will we fear find his invention anticipated by a registration bearing a prior date.—Ed.]

To George William Jacob, *of Hoxton, in the county of Middlesex, printer, for a new manufacture of printed, patterned, ornamented, colored, embossed, and moulded surfaces.*—[Sealed 12th November, 1846.]

The first part of this invention consists in certain methods of producing printed surfaces. The patentee first charges the types from which it is intended to print, with ink, color, or

varnish, in the same way as is adopted for ordinary printing processes, or by means of an endless band, made as hereafter described. He then applies an endless band or roller of printers' composition, to the surface of the types so charged; which band or roller takes the ink, color, or varnish, from the types, and is then applied to the substance required to be printed. If the surface of the substance to be printed on is uneven, care should be taken that the piece of printers' composition of which the band or roller is formed is not too hard, and that it is sufficiently elastic to be pressed into the cavities of such surface. The endless band is made in the following manner:—The patentee takes a sheet of metal, of the same width as the band is required to be made and rather longer, and brings both ends of the sheet together, so that one end overlaps the other, and thereby forms a tube, the circumference of which can be increased or diminished at pleasure. This tube is placed in an endless band of canvass or calico, of the size that the endless band of printers' composition is intended to be made, and by increasing its diameter the canvass or calico is stretched; when thus stretched, the tube is retained at the required size by inserting a circular piece of wood into it; and then the tube thus covered with canvass or calico is placed exactly in the centre of another metal tube, the interior of which should be perfectly smooth, and its internal diameter should exceed the diameter of the first-mentioned tube by the thickness the band of composition is intended to be made. These tubes being placed upright, printers' composition (made of glue and treacle), in a state of fusion, is poured into the space left between one tube and the other; the whole is then left until the composition has become set; and when thus set, the inside tube is reduced in size and removed, and the endless band of composition which has been formed can then be withdrawn from the interior of the larger tube.

When the printed surface is required to be the reverse of that presented by the types, the patentee first charges the types with ink, color, or varnish, and then applies a roller or band of printers' composition to them, as above described; but instead of using the band or roller for operating on the

substance upon which the printed surface is to be produced, he applies it to another roller or band, and uses such last-mentioned roller or band for producing the printed surface.

The patentee claims the new manufacture of printed surfaces, by the use of a roller or band of printers' composition, in a clean state, to charge the types or engraved blocks, or as a means of transfer of the ink, color, or varnish, from the types, instead of applying the types to the substance intended to be printed upon; on many of which, such as stone, glass, or iron, the types when inked would not leave an impression.

The second part of the invention consists in a "new manufacture of patterned surfaces." The block, plate, or stone, on which the pattern intended to be produced has been engraved or drawn, is charged with ink, color, or varnish, and then a roller or endless band of printers' composition is applied to take up the pattern, which is afterwards transferred to any substance intended to receive the patterned surface.

If it is desired that the patterned surface should be the reverse to that presented by the block, plate, or stone, the impression is transferred from the first band or roller to a second band or roller, and the latter is applied to the substance on which the patterned surface is to be produced.

The patentee claims, under this head, the new manufacture of patterned surfaces by the use of a roller or band of the printers' composition, in a clean state, as a means of transfer of the ink, color, or varnish, from the block, plate, or stone, upon which the pattern has been engraved or drawn, instead of applying the block, plate, or stone, to the substance on which the patterned surface is intended to be produced; upon many of which, such as glass, stone, or iron, the block, plate, or stone, when charged, would not leave an impression.

The third part of this invention consists in certain methods of producing ornamented surfaces. The block or plate, on which the pattern intended to be produced has been engraved, is covered with tinfoil, which has previously received a thin coat of glue and treacle (the prepared side being downwards), and such tinfoil is pressed upon the block or plate with some soft pliable substance, as printers' composition or printers' blankets, so as not to tear the tinfoil, but at the same time to

leave the raised parts of it corresponding with the raised portions of the block or plate. The raised portions of the tinfoil are charged with printing ink, color, or varnish, and then it is removed from the block or plate; and as soon as the ink, color, or varnish is sufficiently dry, the tinfoil is flattened, and an ornamented surface is thus produced, corresponding with that presented by the block or plate.

The second method consists in covering the block or plate with colored tinfoil, the plain side of which has been previously covered with a thin coat of glue and treacle (the colored side being upwards); such colored tinfoil is pressed upon the block or plate, as described in the last method, and then the color is removed by chemical means from the raised portions only of the tinfoil; after which it is removed from the block or plate and flattened.

The third method consists in producing a pattern upon a sheet of tinfoil with ink, color, varnish, or paint, of such a nature that it will adhere to the glass or other substance which is to be ornamented; such tinfoil is then applied with the printed side downwards to any substance that will not be affected by quicksilver, and which is perfectly clean and dry; the tinfoil is rubbed on the back with a piece of wood, covered with blanket or other suitable rubber, so as to cause it to adhere perfectly to such substance (care being taken not to tear the tinfoil); and then the glass or other substance, with the tinfoil attached, is covered with quicksilver, which is allowed to remain until it has dissolved or raised the tinfoil, when the amalgam is to be carefully removed, leaving the ink, color, varnish, or paint, only, attached to such surface. The glass or other substance thus ornamented is to be warmed sufficiently to soften the ink, color, varnish, or paint, and when thus softened, the ink, color, varnish, or paint, is covered with a thin sheet of dry paper, and rubbed with some soft substance, such as a roll of flannel, to cause a perfect contact between the glass or other substance and such ink, color, varnish, or paint.

The fourth method is very similar to the third; the only difference being, that after the tinfoil has been laid on the glass or other substance, with the pattern side downwards,

the patentee cuts out portions of the tinfoil containing any part of the pattern which he desires to remove or alter, and inserts in those places other pieces of tinfoil, ornamented with similar ink, color, varnish, or paint, according to the design that he desires to introduce, and then these last-mentioned pieces of tinfoil are rubbed with some soft suitable rubber; or instead of inserting other pieces of tinfoil, the spaces left by such removal are charged with color: after this has been done, the quicksilver is applied, and the remainder of the operation is conducted in the manner before described.

The fifth method consists in covering a block or plate, which has been engraved with some sunk design, with a piece of net, lace, or other ornamentally-patterned thin substance, and placing a piece of plain or colored tinfoil (prepared with a thin coat of glue and treacle, as above described) over the block or plate; pressure is applied with some soft substance, such as printers' composition or blanket, and while the tinfoil remains on the block, the patentee charges those parts only of it which are raised with ink, color, or varnish; as soon as the ink, color, or varnish, is sufficiently dry, the tinfoil is flattened, and an ornamented surface is thus produced. Under this part of his invention the patentee claims the use of tinfoil in the manner and for the purposes above described.

The fourth part of the invention consists in a new manufacture of colored surfaces. The patentee charges a block, either plain or patterned, with color; and before such color is dry he applies a roller or band of printers' composition to the surface of the block, and afterwards applies it to the surface intended to be colored. If the pattern to be produced on such surface is required to be the reverse to that presented by the block, a second roller or band is used, to transfer the ink, color, or varnish, from the first roller or band to the surface that is to be colored.

The patentee claims the use of a roller or band of printers' composition, in a clean state, as a means of transfer of the color from the block to any substance on which a colored surface is intended to be produced, instead of applying the block to such substance; upon many of which, such as glass, stone, or iron, the block, when colored, would not produce an impression.

The last part of this invention consists in certain methods of manufacturing embossed and moulded surfaces. The first method consists in covering a die or other sunk design with a thin sheet of tinfoil, then placing some soft flexible substance on this tinfoil, and, by pressure, indenting the tinfoil into or upon the design, so that it covers the entire surface of the design, however uneven such surface may be. When the metal has been perfectly embossed, the soft substance is removed, and a composition of glue and treacle, in a state of fusion (or any substance or composition which may be poured or pressed in, and will afterwards harden) is poured into or upon this metal; then a wooden or other scraper is passed carefully over the metal, so as to leave the composition only in the sunk portions of the design. When the composition or substance has hardened, the metal, with the composition in the sunk portions, is removed from the block or design, and the whole fastened on the surface that is to be moulded or embossed; after which, the tinfoil is removed, leaving the composition only attached to such surface.

The second method is similar to the first; the only difference being, that after the scraper has been used, the patentee applies to the back of the printers' composition or other substance, a coat of any suitable material, which then forms the groundwork whereon the design is to be produced; after the composition has hardened, the whole is taken from the die, and then the tinfoil is removed. If the printers' composition is used, it may be gilt, or otherwise ornamented with any dry pigment or powder.

The third method consists in operating in the same manner as the first method, until the composition or substance, with the tinfoil, is removed from the original design, and then printers' composition, in a state of fusion (or any other substance which can be poured or pressed in, and will afterwards harden), is poured on the side of the tinfoil which had been previously next the original design; this composition or substance is allowed to harden, and when hardened, the two parts are separated, and a facsimile of the original design is thus produced.

The fourth method consists in covering the die or other sunk design from which it is intended to mould, with a piece

of net, gauze, or other thin-patterned substance, upon which tinfoil is to be laid, and covered with some soft flexible substance. The tinfoil is indented into the block or die, by pressure, and then the soft flexible substance is removed, and a composition of glue and treacle, in a state of fusion, is poured into the indented tinfoil;—after the composition has hardened, the tinfoil, with such hardened composition, is taken from the die or sunk design, and the tinfoil is removed from the printers' composition or other substance.

Under this head of his invention, the patentee claims the use of tinfoil, as above described.—[*Inrolled in the Inrolment Office, May*, 1847.]

To JOHN CONDIE, *of Glasgow, engineer, for improvements in machinery used in manufacturing malleable iron.*—[Sealed 15th October, 1846.]

THE first part of this invention relates to steam-hammers, to be employed in the manufacture of malleable iron. In the steam-hammers described under the patents of Watt, Deverill, and Nasmyth, the steam-cylinder was stationary, containing a moveable piston, and the hammer-face was fixed to the piston-rod; now the present improvement consists in constructing the machine with a fixed or stationary piston and piston-rod, and a moveable steam-cylinder, to the lower end of which the hammer-face is affixed.

In Plate XV., fig. 1, exhibits, in vertical section, the principal working parts of the machine, separated from the framework, and without the gearing for regulating the action of the hammer; as the patentee, although he has described an arrangement of rods, levers, &c., for this purpose, does not confine himself thereto, but states that the construction of these parts may be varied, according to the judgment of the engineer. Fig. 2, is a horizontal section of the steam-cylinder, taken on the line 1, 2, of fig. 1. *a*, is the cylinder; *b*, the hammer-face attached to the same; *c*, the piston; and *d*, the piston-rod, secured, at the upper end, to the framing *e*. *f*, is an equilibrium steam-valve, the cylinder of which is

connected at the upper part by a pipe (not shewn in the figures) with the steam-boiler; this valve admits the steam into the tube *g*, which encases the piston-rod, and serves the same purpose as the steam-passage of ordinary steam-engine nozzles. Steam being admitted through the tube *g*, will, by its pressure against the cylinder-cover, raise the cylinder, until the valve, by moving into the position shewn at fig. 1, cuts off the supply of steam, and at the same time opens the port *h*, from which the steam that has been used for raising the cylinder escapes through the exit-pipe *i*, into the atmosphere. When this takes place, the cylinder descends rapidly with the hammer-face upon the heated iron, which has been placed on an anvil beneath; the cylinder being guided in its descent by tongues or guides, formed on the upright bars of the framework, and entering the grooves *j*, at each side of the cylinder, as shewn at fig. 2. Steam being now admitted into the cylinder, the operation just described is repeated.

k, *k*, are two ports, which allow the air to escape from beneath the piston when the cylinder is ascending, and to enter beneath it when the cylinder is falling. If the hammer is required to strike with greater force than would result from its weight alone, by opening the throttle-valve to the fullest extent, the ports *k*, *k*, will be caused to pass the piston, and the air being compressed between the piston and the bottom of the cylinder, will impart additional force to the stroke of the hammer. The patentee also proposes to work the hammer without the air-ports at the bottom of the cylinder; in which case, the cylinder is made longer than that shewn at fig. 1, and the air is compressed beneath the piston as the cylinder is raised, until its density is about half that of the steam; then the steam being allowed to escape, the compressed air gives additional force to the blow of the hammer, as before mentioned. If desired, steam may be admitted beneath the piston, to force down the hammer. The tube *g*, is made with a small flange at the top, for the purpose of forming a steam-tight joint at the part where it terminates in the framing *e*; this joint is made by placing a ring of vulcanized India-rubber above, and another below the flange,

and securing the whole firmly in the recess formed in the under side of the framing *e*, by the bolts *l*, *l*, and collar *m*,—by forming the joint in this manner, it is prevented from being injuriously affected by vibration. The patentee says, that he provides against any side vibration, which might injure the piston, by making the body of the piston smaller than the internal diameter of the cylinder; so that only the packing-rings will be affected.

The second part of this invention consists in casting forge anvils, and hammer and squeezer faces, with wrought-iron tubes therein; so that water may be caused to circulate through the same, and thus keep them cool when in use; the connection with the supply-pipe being made by means of a leather tube, similar to those employed in the water tuyeres now used in hot-blast furnaces.

The patentee claims, Firstly,—the so arranging or constructing steam-hammers, that the steam-cylinders have hammer faces applied thereto, and move therewith. Secondly,—the introduction of malleable iron tubes into anvils, and hammer and squeezer faces.—[*Inrolled in the Inrolment Office, April,* 1847.]

To HENRY MAPPLE, *of Child's Hill, Hendon, in the county of Middlesex, machinist, for improvements in apparatus for transmitting electricity between distant places, and in electric telegraphs.*—[Sealed 27th October, 1846.]

THE first part of this invention consists in a mode of applying a tubular leaden covering to the wires used in electro-telegraphic communication. The wires are insulated by first covering them with cotton, and then applying a coat of any suitable melted materials; after which, they are enclosed in a leaden tube, of such size as will admit of the wires being readily drawn through it in the manner hereafter described. The space around the wires within the tube is filled with a heated mixture of Stockholm tar and pitch, or other non-conducting material, and while the mixture is yet hot, and in a fluid state, the tube is placed in the jacket or cylindrical

vessel *a*, forming part of the apparatus represented at fig. 1, in Plate XVI. The jacket is heated by hot water or other means, in order to keep the tube (marked *b*,) and wires hot, and preserve the non-conducting material in a fluid state, until the tube has been reduced to the desired size, by passing between the three pairs of rollers *c*, *d*, *e*, which have semicircular grooves, of different sizes, formed around their peripheries. The front end of the tube *b*, is placed in the circular groove, formed by the junction of the rollers *c*, *c*, which groove is about one-eighth of an inch less in diameter than the tube; and the tube is clasped so tightly, that when the rollers *c*, *c*, are made to revolve, it is drawn forward between them, and is at the same time reduced in size and increased in length. The tube passes successively between the other pairs of rollers *d*, *d*, *e*, *e*, by each of which it is reduced one-eighth of an inch in diameter, and increased in length; and it is then wound on the drum *f*. During this operation the tube travels freely on the wires contained therein, which wires must be considerably longer than the tube when it is first placed in the jacket *a*. The patentee does not confine himself to the arrangement represented at fig. 1, as the axes of the rollers may be placed vertically instead of horizontally; or the whole length of the tube may be drawn between one pair of rollers, before it enters between the next pair; other means of heating the tube may also be substituted for the hot-water jacket *a*; and instead of grooved-rollers, draw-plates or dies may be used.

To facilitate the introduction of the wires into long tubes of small diameter, longitudinal slits are cut in them, at distances of about twenty-one feet apart; the wires are fastened to a needle or wire, the length of which exceeds the distance between the longitudinal slits; this needle is introduced at one end of the tube, and moved forward in the same until it appears at the first slit, through which it is to be drawn until the ends of the wires have arrived at the slit; the needle is then again introduced into the tube through the slit, and passed onwards to the second slit, through which it is to be drawn, as before mentioned, in order to bring the ends of the wires to the second slit; and this operation is repeated

until the needle and wires reach the other end of the tube. The openings or slits are now to be closed, by beating the parts together; and after the tube has been passed between the rollers or draw-plates, the edges are joined by solder. When tubes of large diameter (compared with the wires introduced), or short lengths of tubes are to be employed, slits will not be necessary.

The second part of this invention consists in protecting the leaden tube containing the conducting-wires, as shewn at fig. 2. *a, a,* are the wires, having cotton wound round them, and covered with pitch or other insulating material; *b,* is the leaden tube containing the wires, and protected by winding coir-rope around it, as shewn at *c.* When thus coated it is passed though a bath of hot pitch, and afterwards (while the pitch is yet hot) conducted though a trough filled with sand, which is well rubbed into it by hand; and, mixing with the pitch, fills up the interstices between the strands of coir-rope, as at *d.* When the tube *b,* is to be laid under ground, it may be further protected by placing it in a cast-iron pipe *e.* The patentee does not confine himself to the use of coir-rope for the above purpose, as other materials, such as list, hemp, tape, baize, felt, sail-cloth, or any suitable woven fabric, or spun fibrous matter, may be wound around the tube.

The third part of the invention consists in improvements in suspending the magnetic needles used in electric telegraphs, and lessening their vibration. Fig. 3, is a side elevation, partly in section, shewing the mode of mounting a pair of needles; and fig. 4, is a front view of one of the needles. The needles *a, a,* are fixed on a cranked spindle *b,* furnished with two steel pivots *c, c,* which rest on two small square pieces of agate or other hard material *d, d,* let into the brass block *e*: one of the pieces *d,* has a conical hollow, and the other has a groove cut in it, parallel to the spindle *b,* to receive the points of the pivots *c, c.* The weight of the needles and spindle *b,* is supported by the pivots, and the needles are kept in a vertical position by their lower ends being made heavier than their upper ends. To the sides of the block *e,* are fixed two brass brackets or bearings *f, f*; the upper ends

of which are forked, to receive the spindle *b*, and prevent it from being thrown out of the proper position by any sudden vibration of the needles. The patentee lessens the vibration of the needles, after each deflection, by placing a small vessel containing oil immediately under the lower end of the inner needle, so that the extreme end of the latter will dip into the oil when the needle is in a vertical position, or nearly so; and thus, after the needle has been deflected, the friction resulting from its motion through the oil will immediately steady it, and tend to prevent continued vibration. The same object may be effected by employing a cup containing iron-filings, as shewn at *g*, in fig. 3; or by placing a small bar of iron in the same position, so that it will attract the magnetic needle.

The last part of the invention relates to electro-magnets, which are formed, as is well known, by passing a current of electricity through a coil of wire surrounding a bar of soft iron. It has been found that, if the iron be not perfectly soft and pure, a portion of magnetic power often remains in the core after the cessation of the exciting current, which residual magnetism is prejudicial to the working of the electro-magnet. To obviate this inconvenience, the patentee proposes to wind the covered wire on a hollow reel, as shewn in plan and side view, at figs. 5; in the centre of this reel is placed the end of a piece of soft iron, which iron, on a current of electricity being passed through the coil, is attracted thereby, and has a tendency to pass yet further into and through the hollow cylinder forming the centre of the reel.

The patentee claims, Firstly,—causing an external tubular covering of lead to wires to be reduced, so as to embrace more closely the wires contained, as above described; also the introduction of wires into leaden tubes, in the manner above described. Secondly,—the protecting of leaden tubes containing wires, by covering them as above described. Thirdly,—the mode of suspending magnetic needles, as above described; and also the means of impeding vibration. Fourthly,—the mode of forming an electro-magnet, as above described.—[*Inrolled in the Inrolment Office, April,* 1847.]

To Henry Henson, *of Hampstead, in the county of Middlesex, Gent., for a new fabric, suitable for goods' wrappers, waggon-covers, and other like purposes; and certain processes employed in the manufacture of the same.*—[Sealed 5th November, 1846.]

This invention consists in the manufacture of two kinds of fabrics; one being suitable for covering waggons, coaches, carts, and other vehicles, &c., and the other for wrapping or covering light goods, which are not generally exposed to the weather, and for similar purposes.

The base of the first fabric is hempen thread; and the patentee interweaves therewith, while the fabric is being made in the loom, a certain number of copper wires covered with thread, or galvanized iron wires covered with thread (but uncovered wires may be used, if preferred), or thin strips of cane; the object being to produce a fabric which shall not be liable to be rent or torn. The wires or strips of cane may be inserted at distances of from one to six inches apart, according to the degree of strength required, and the thickness of the wires or strips; and they may form part of either the warp or weft. The patentee states that, for the ordinary kind of fabrics, No. 28 wire will be found suitable, and that the requisite degree of strength may be obtained by inserting it at distances of two inches apart. The fabric is immersed in a vat, filled with tanning liquor; in making which one hundred weight and a quarter of good oak bark has been used for every hundred gallons of liquor; and the piece immersed must be so proportioned to the quantity of the liquor, that for every yard of the fabric there shall be about two gallons of tanning liquor. The fabric remains in the liquor for about fifty hours; during which time a temperature is kept up of 150°, and the fabric is turned occasionally, in order that it may be equally saturated throughout; it is then removed from the vat, and hung up to dry. If the fabric be required to possess the quality of leather in a greater degree than can be given to it by the above process, this may be effected by subsequently immersing it, for about ten hours, in a weak solution of gelatine or albumen, and repeating this operation two or three times,

according to the effect desired to be produced. Instead of the above process of tanning, the well-known processes of tanning by exhaustion, or by hydraulic pressure, may be employed. The fabric is now waterproofed, by first saturating it with a composition called by the patentee No. 1, and, when that has become dry, coating it with another composition termed No. 2. The first composition is formed of one gallon of turpentine, one pound of tallow, and one pound of bees' wax; and the second is composed of two quarts of raw linseed oil, one quart of boiled linseed oil (rendered drying by the addition of litharge), one quart of Stockholm tar, and twenty ounces of lamp-black or ground charcoal. The fabric is placed upon a hollow iron table or chest, heated by the admission of steam into it, and the compositions are applied by means of a spatula or brush; the first composition being forced into and through the fabric, and the second laid on evenly and smoothly.

The second description of fabric for covering light goods, &c., is made by pasting, cementing, or otherwise uniting a sheet or web of paper to a sheet or web of calico or similar textile fabric, which has been previously waterproofed and japanned by any of the well known processes.

The patentee claims, Firstly,—the manufacturing of the said new fabric of a quality suitable for the covering of waggons, coaches, carts, and other vehicles, and for all other like out-of-door purposes, by the weaving together of hempen thread and metallic wire or cane strips, and afterwards tanning, saturating, coating, and otherwise treating the compound fabric, as above described. Secondly,—the employment, for the purpose of strengthening, waterproofing, and otherwise improving the quality of goods' wrappers, waggon-covers, and other like fabrics (of whatever materials the same may be composed), of the tanning, saturating, and coating processes, all or any of them, above described. Thirdly,—the manufacturing of the said new fabric of a quality suitable for the wrapping and covering of light goods and other like purposes, by combining paper with calico, or such other like textile fabric, previously waterproofed and japanned, as above described.—[*Inrolled in the Inrolment Office, May,* 1847.]

To Arthur Millward, *of Birmingham, in the county of Warwick, Gent., for certain improvements in producing figured surfaces, sunken and in relief.*—[Sealed 15th October, 1846.]

This invention is divided into eight parts; it consists, firstly, in the following method of producing sunken designs on metallic surfaces:—The design is painted, drawn, or otherwise depicted* on the metallic surface to be ornamented, or it is imprinted thereon by stencilling or transferring; a thin coat of gold, silver, copper, or other metal is deposited by voltaic electricity or other means on all parts of the surface, except those which are covered by the design, or are, to use the patentee's words, "stopped out;" then the coloring or other materials employed in the stopping out are cleared away, and the surface is connected with the negative pole of a voltaic battery, or electro-magnetic machine, in which the solution employed is of such a nature as to act only on the ground-plate, whereby all those parts of the plate which were covered by the stopping out, but are now laid bare, may be decomposed or eroded to any extent required. Instead of a voltaic battery or electro-magnetic machine being employed, the metallic surface may be immersed in any acid or alkaline or other saline solution, capable of acting on the exposed portions of the surface, but not on the precipitated metal. The sunken design may be intersected in different parts by cross lines in relief, so as to present the appearance of "cross-hatching," by inserting such lines with a pencil dipped in varnish, after the plate has been cleared of the stopping out, and before it is subjected to the decomposing or eroding action.

The second improvement consists in producing sunken designs on metallic surfaces, by first covering the whole of the surface, in the manner above mentioned, with a coat of any suitable metal, and varnishing the same; next scraping the design in the varnish; and then subjecting the surface to the decomposing or eroding process, whereby the metal left exposed by the scraping out is removed and the sunken design produced.

The third improvement consists in producing figures in relief on metallic surfaces, by first coating the same with any suitable metal, and painting, drawing, or otherwise depicting the required design thereon, or imprinting the design upon it by stencilling or transferring; the design is then intersected by indented lines and cross lines, after the manner of line engraving (the whole of the color or other material used in laying on the design being cleared away from such lines); and, after this, all those parts of the deposited metal which are left exposed are removed by the eroding process, and the lines of the design only left standing in relief from the ground-plate.

The fourth improvement consists in the following method of producing designs in relief:—The surface or ground-plate is varnished all over, and at certain parts the varnish is scraped away to form the required design; upon the exposed parts a coat of any suitable metal is deposited, and the remainder of the varnish is then removed from the plate; after which, the unprotected parts of the ground-plate are removed to the desired extent by the decomposing or eroding process.

The fifth part of the invention relates to the production, in metals, of designs which partake of the character of being both sunken and in relief, and are commonly termed "pierced work." To the ground-plate a thin coat of any suitable metal is applied, by electro-deposition or otherwise, and the design is painted thereon; all the parts except those beneath the design are then subjected to the decomposing process, until the said parts (both ground-plate and coating) are completely eaten through. The color or other material used in laying on the design may be afterwards cleared away.

The sixth part of the invention also relates to "pierced work." A metal-plate, on which a raised design has been stamped out, is covered all over with any suitable metal by electro-deposition; then, by means of a scraper or other tool, the deposited metal is removed from those parts which are to be pierced through; and, after this, the exposed portions of the plate are decomposed or eroded. The same object may be effected by cutting through the metal deposited on the front of the plate all round the design, when so much of the

deposited metal as covered the design drops out; and all the parts of the plate from which the deposited metal has been removed are then dissolved or decomposed by the means before mentioned. Any suitable varnish may be used instead of a coat of metal as the stopping-out material in the above processes.

The seventh part of the invention relates to the mattening or deadening of articles with plain or figured surfaces, which have been manufactured by the processes of stamping, embossing, or casting. The portions of the surface required to be mattened or deadened are covered with varnish or other suitable medium, and the remaining portions of the article are coated with any suitable metal by electric deposition; the varnish or other medium being then cleared away, the parts of the plate left unprotected are subjected to the decomposing process. A similar effect may be produced by at once stopping out all the parts but those required to be mattened or deadened, and submitting the plate to the decomposing or eroding process.

The last part of the invention relates to the production of engraved surfaces, sunken and in relief, from which impressions may be taken on paper, cloth, or other suitable material, by the ordinary modes of printing or embossing. If the design is to be sunken, it is painted or otherwise depicted on a plate or metallic surface; a thin coat of any suitable metal is next deposited upon the uncovered parts; then the color or other material employed in forming the design is cleared away, and the parts of the plate thus left uncovered are decomposed or eroded to the required depth. When the design is required to be in relief, the plate first receives a coat of any suitable metal; the design is then painted thereon; and those portions of the deposited metal which are not covered by the design are decomposed, leaving the design standing out in strong and clear relief.

The patentee claims, Firstly,—the producing of sunken figured surfaces by the combination of painting, drawing, transferring, stencilling, or other known processes of delineating objects with the direct action of voltaic electricity, in the manner above described. Secondly,—the producing of

sunken figured surfaces by the employment of a combination of metallic precipitates or deposits with the direct action of voltaic electricity, as above described. Thirdly,—the producing of figured surfaces in relief by the combination of metallic deposits with painting, drawing, transferring, stencilling, or other known processes of delineating objects, and with or without the addition of the process of line-indenting or engraving, as above described. Fourthly,—the producing of figured surfaces in relief by the combination of the processes of varnishing and scraping out with the metallic deposits, and the direct action of voltaic electricity, or acid or alkaline or other saline solution, as above described. Fifthly, and Sixthly,—the producing of pierced work by all or any of the processes described under the fifth and sixth heads of this invention. Seventhly,—the process of mattening or deadening plain and figured surfaces, above described. Eighthly,—the production of figured surfaces, sunken or in relief, for the purpose of printing from or embossing, by the processes described under the last head of the invention.—[*Inrolled in the Inrolment Office, April*, 1847.]

Scientific Adjudication.

Privy Council Office.—May 15*th*, 1847.

EXTENSION OF MITCHELL'S PATENT.

THE Judicial Committee of the Privy Council met this day to consider the application of Mr. Alexander Mitchell for the extension of a patent, granted to him on the 4th July, 1833, under the title of "an invention of a dock of improved construction, to facilitate the repairing, building, or retaining of ships and other floating vessels."* The principle part of this invention appeared to consist in the construction and use of screw-piles, on which to erect lighthouses, beacons, &c., on submarine sand-banks; and for screw-moorings, applicable to harbours and roadsteads.—Mr. William Carpmael described the invention, which he said was quite new at the time of the patent, and was the only one applicable to shifting sands. He had seen the lighthouse upon the Maplin sand, erected in 1838, which was a wonderful structure, and is now as firm as when first erected. Mr. Mitchell

* For specification of this patent, see Vol. IV., p. 12, Conjoined Series.

(the patentee) gave a history of the invention, and stated, that in consequence of the difficulty of getting it adopted for lighthouses, &c., he had not obtained the remuneration which he felt himself entitled to receive. This evidence was corroborated by his son, Mr. John Mitchell.—Mr. James Walker, C.E., stated, that the Trinity House, at his recommendation, had erected the lighthouse on the Maplin sand; and he had been perfectly satisfied with it. A beacon was also erecting upon Mr. Mitchell's screw-piles on the Tongue sand. It was the most economical and effectual mode of forming a foundation on banks covered by the sea that had yet been discovered; and there were other spots imperfectly lighted, to which it might be applied with advantage. —Mr. S. P. Bidder said, he was resident engineer of the Fleetwood-on-Wire Railway, and had charge of the lighthouse erected by the Messrs. Mitchell, in Morecombe Bay, in the year 1840, since which time it had required no alteration or repair, and gave general satisfaction. It was the best light on the coast. There was generally a very heavy sea on that part of the coast; but the piles were so placed that the waves went through them; and so little vibration was produced, that it did not effect the clock in the tower.—Mr. Jackson, accountant, put in the accounts, and Mr. Brooks, C.E., spoke to the value of Messrs. Mitchell's services, which, if allowed for at the most moderate rate, would leave no profit upon the gross amount received.

Lord Brougham, in giving judgment, said, that from the peculiar nature and merit of the invention, and considering that it was one which would not be expected to come into general use for some years, their lordships had come to the decision of recommending to Her Majesty to extend the patent for the full term prayed for—14 years.

Before the Vice-Chancellor of England.—May 22nd, 1847.

BRETT ET AL *v.* THE ELECTRIC TELEGRAPH COMPANY AND MASSI.

THIS was a motion for an injunction, on behalf of the plaintiffs, Messrs. Brett and Little, who had obtained a patent for "improvements in electric telegraphs, and in the arrangements and apparatus to be used therein," to restrain the defendants from constructing, altering, making or using any galvanic batteries, constructed or altered according to the design registered by the defendant Charles Massi, or otherwise, upon the principle of the plaintiffs' said invention. The plaintiffs had obtained a patent for their invention on the 11th of February; and the defendant Massi had registered a design for a percolating battery on the 16th February, under the act relating to articles of utility; which battery it appeared was similar to one forming part of the plaintiffs' patented improvements. The invention consisted in

the construction of galvanic troughs or batteries, so as to permit the sulphuric acid, or other exciting liquor, to fall gradually from a reservoir above into the cells of the battery, and after acting upon the metallic plates, to escape gradually by means of perforations made in the bottom of the cells of the galvanic trough, which cells were to be filled with sand or some other absorbent matter, to retain a certain quantity of the exciting liquor in contact with the metallic plates. By thus keeping up a continuous flow of the liquor, it was found that the corrosion of the plates was considerably retarded, and thus a great economy was effected in working galvanic batteries for telegraphic and other purposes. For the defendant Massi, it was contended that a publication of his invention had taken place previously to the date of the plaintiffs' patent, by an agreement dated the 25th day of January, and made between the defendant and the electric telegraph company, under which agreement the defendant Massi (in consideration of the yearly sum of £25 for ten years) agreed to allow the electric telegraph company to use his invention, and the company were to be at liberty to make trial of the improved battery for the space of thirty days next ensuing the date of the agreement; but that if the company, at the expiration of the said thirty days, should decline to adopt the said invention, they should keep the same secret from all persons whomsoever. Mr. Stuart, Mr. Webster, and Mr. Prior, appeared for the plaintiffs; Mr. Rolt and Mr. Metcalfe for the defendant Massi; and Mr. Bethell and Mr. Heathfield for the Electric Telegraph Company.

The Vice-Chancellor said it appeared to him that no publication had taken place of the defendant's invention at the time of making the agreement with the Telegraph Company, since it was expressly provided, that in case the company declined at the expiration of thirty days to adopt the invention, they were not to divulge the secret. He should, therefore, grant the injunction.

Scientific Notices.

ON A PROCESS FOR SPEEDILY ASCERTAINING THE QUANTITY OF AZOTE CONTAINED IN ORGANIC SUBSTANCES.

BY M. EUG. PELIGOT.

[*Translated for the London Journal of Arts.*]

The knowledge of the quantity of azote contained in organic matters has become of such importance for the study of questions relative to physiology and agriculture, that an account of the experiments which I have made to ascertain the presence of that element, by a method much more expeditious and simple than those ordinarily employed for that purpose, will doubtless

be found useful. All chemists are aware of the imperfection of the methods now pursued. The ordinary process, which consists in collecting the azote in a gaseous state, only gives correct results when the combustion of the azotous substance is very slow, and when the substance itself is either very easily burned or comminuted. As this combustion requires the employment of very long tubes, which must be kept at a high temperature during several hours, it is a very fatiguing operation, especially when the azote is required to be in large quantities, as is the case for most purposes connected with physiology and chemical agriculture.

Messrs. Will and Varrentrap's method, which consists in determining the azote under the form of double chlorate of platinum and ammonia, presents also very serious inconveniences. If the combustion of organic matter in the presence of lime, combined with soda or potash, is effected more rapidly than by the other process, the ascertaining the quantity of ammonia furnished by the combustion is always a long operation, from the necessity of evaporating the salt of platina in a water-bath, and filtering, washing, and drying at a fixed heat. The real weight of the salt is, besides, rendered uncertain, from the liquid carburets with which it is often mixed, and which are not easily separated by ether and alcohol. It is, besides, known how speedily a pulverulent compound, such as the double chlorate of platinum and ammonia, absorbs a greater or less quantity of humidity from the atmosphere.

The process I propose to adopt, is a very simple modification of Messrs. Will and Varrentrap's method; so simple, that other chemists, and, in particular, M. Baudrimont, have taken into consideration, if not the details, the principle upon which it is founded. The combustion of the azoted substances is effected by the ordinary mixture of lime and soda: the ammonia arising from this decomposition is condensed in a tube similar to those employed by German chemists. But this tube, instead of containing hydrochloric acid, contains a certain quantity of concentrated sulphuric acid. As the ammonia combined with that acid dilutes or weakens it, it becomes easy (by determining, after the combustion is finished, the composition of the liquor, and by comparing this composition with that which it presented before) to ascertain the quantity of ammonia which has been condensed, and, consequently, the quantity of azote furnished by the substance submitted to the analysis.

This operation is performed with rapidity and precision, by means of a saturated alkaline solution. The alkaline liquor I prefer is a solution of lime and sugar. It is well known that slacked lime dissolves much more easily in a solution of sugar than in pure water. The saccharate of lime produced offers the same alkaline reaction as if the base it contains were in a free state. This compound may be kept free from injury in closed

vessels, so as not to be exposed to the carbonic acid of the atmosphere (for by contact with that acid carbonate of lime is produced); and as that insoluble salt renders the liquor, in which it is produced, thick, it is sufficient to filter the latter, in order to render it fit for again ascertaining the strength of the sulphuric acid employed.

The manner of performing that operation is as follows:—The substance containing azote is mixed in the ordinary manner with the lime and soda, and introduced for combustion into a glass tube, from two to three feet long, to which a condensing apparatus is adapted by means of an India-rubber stopper, which answers very well for avoiding the condensation of ammonia. In this condensing apparatus 10 cubic centimetres (about three cubic inches) of concentrated sulphuric acid, measured in a narrow graduated pipe, are introduced. The acid I employ contains 61.250 gr. of rectified acid (SO^3, HO) for every quart of water; 100 cubic centimetres of this liquor will therefore correspond to 2.12 gr. of ammonia, or to 1.75 gr. of azote.

Combustion is carried on in the ordinary manner, and is stopped when the substance has become white, and the gaseous products cease to be disengaged; at the conclusion of the operation, the gases contained in the tube are driven out by passing through it a current of air.

The acid used in condensing the ammonia is now poured into a glass vessel, and the apparatus which contained it is carefully washed; and this liquor, diluted with a considerable quantity of water, is colored red by the addition of a few drops of litmus. By means of the solution of saccharate of lime, which is contained in a vessel graduated with cubic centimètres and tenths of cubic centimètres, the acid liquor is saturated, the operator being guided by the blue color which is suddenly developed in the liquor, immediately that it is completely saturated. The divisions on the vessel will shew the quantity of alkaline liquor employed for the purpose. Having ascertained, by previous experiment, the quantity of saccharate of lime necessary to saturate ten cubic centimètres of the concentrated sulphuric acid, in a normal state, by subtracting from that quantity of saccharate of lime the quantity which was found sufficient to saturate the acid containing the ammonia of the azotous substance, the quantity of acid solution saturated by that ammonia may be ascertained, and, consequently, the weight of the azote contained in that body.

I will cite, as an example of this improved method (the correctness of which I have ascertained by operating upon a great number of substances containing azote), the determination of the quantity of azote in the substance called "*oxamide*," which is produced by the distillation of oxalate of ammonia.—0.417 gr. of this substance were burned. 10 cubic centimetres of concentrated sulphuric acid, in its normal state, will saturate 33.5 parts

of the alkaline solution of saccharate of lime contained in the graduated vessel. After combustion, 10 cubic centimètres of the same acid will only saturate 8.5 parts of the same alkaline liquor.

By subtracting 8.5 parts from 33.5, 25 parts of the alkaline liquor will remain, which represent the quantity of acid saturated by the ammonia produced from the substance analyzed. This quantity is $7^{cc}.46$. Now, as 10 cubic centimetres of concentrated acid correspond to 0.175 gr. of azote, $7^{cc}.46$ of the same acid correspond to 0.130 gr. of azote contained in 0.417 gr. of oxamide. It will consequently be found, that 100 parts of this substance contain 31.3 of azote.—Calculation gives 31.7.

By proceeding as above indicated the quantity of azote may be ascertained in half an hour at most, with a precision equal at least to the ordinary methods, by which, to effect the like results, three hours are required.

I have proved that matters containing very little azote, such as wheat, arable land, and human excrement, may also be analyzed in this manner, if a sufficient quantity be operated upon. I am of opinion that this process will be very useful to chemists, and particularly to those occupied in the study of vegetable and animal physiology, by allowing the ordinary quantities to be increased without trouble or expense.—[*Comptes Rendus.*]

ON THE DIFFERENCE WHICH EXISTS BETWEEN GILDING BY MERCURY AND ELECTRO-GILDING.

BY M. BARRAL.

The author of this paper says that he has been frequently called upon to solve the following question, viz.:—"By what means had a certain article of copper or silver been gilded?" This could not possibly be ascertained with certainty by mere inspection, even by the most experienced eye. M. Barral has, however, discovered a certain means of ascertaining the fact by chemical reaction. He has found that by attacking the articles to be tested with dilute nitric acid, either warm or cold, pellicles of gold are obtained, of the exact form of the article; provided the acid be not allowed to act too energetically. These pellicles are of a yellow gold color on both sides, when obtained from articles gilt by simple immersion in an alkaline solution of gold, or by means of the galvanic current decomposing certain solutions. On the contrary, the pellicles produced on the surfaces of articles gilt by mercury are of a reddish-brown color on the side next the surface of the articles gilt.

In order to explain this difference in the appearance of the pellicles of gold, M. Barral first had certain articles gilt by the mercury process with certain quantities of gold. The articles thus gilt, on being acted upon by dilute nitric acid, furnished

pellicles of gold of a deep brown color on their inner faces, and heavier than the gold orginally employed in the gilding process. The pellicles not dissolved by the acid were therefore not pure gold.—They were proved by direct analysis to contain about 3 per cent. of copper or silver, according to which of these two substances the gilt article was formed.

M. Barral therefore considers it evident that when the amalgam of gold is applied to the surface of an article, a double amalgam of gold and copper or silver is formed. If the article be then submitted to heat, the mercury will be volatilized, and an alloy will be formed, thereby uniting the precious metal and the metal of which the article is formed. If the article gilt be then acted upon by nitric acid, the metal of which it is formed will be completely dissolved, and the acid will act upon the alloy, and carry off the copper or silver near the inner surface, where the gold is in small quantity. But, as the proportion of gold increases near the outer surface, it will preserve the other metal from dissolution, as is well known to be the case with all alloys in which gold predominates.

It will therefore be understood, that the pellicles detached from articles gilt with mercury must be covered on their inner surface, after being acted on by the nitric acid, with a very thin layer of gold, which gives it a brown color; this will also explain the reason why nitric acid leaves the gold in an impure state after the destruction of the base metal of the articles.

When an article to be tested has been gilt by electro-chemical means, it will be found that the pellicle of gold covers the copper or silver, without amalgamating therewith; and therefore the nitric acid will not act upon the layer of gold.

The foregoing explanation proves the new methods of gilding to be less solid than the old ones; for it is evident that a layer merely laid on like a coat of paint, cannot adhere so tenaciously as when the metals are to a certain extent incorporated. Experience has proved, however, that the processes of electro-gilding and gilding by simple immersion possess certain advantages over the old methods. The pellicle obtained from the gilding by mercury, when held up to the light, presents an appearance of being perforated with numerous fine holes; this effect is produced by the passage of the mercury through the gilding when driven off by evaporation. Layers of gold deposited by a battery or by immersion are, however, perfect coatings; and consequently, for domestic purposes—especially for vessels intended to come in contact with acids—copper articles, gilt by the mercury process, possess disadvantages which are obviated by the new processes.—[*Ibid.*]

ON THE METHOD OF ASCERTAINING WHETHER A FABRIC APPARENTLY MADE OF HEMP OR FLAX CONTAINS PHORMIUM TENAX OR NEW ZEALAND FLAX.—BY M. VINCENT.

THE Commissioners (M. M. Gaudichaud, Payen, and Boussingault), after stating that they had been commissioned by the Academy to enquire into M. Vincent's method of ascertaining the presence of Phormium Tenax in fabrics apparently composed of hemp or flax, proceed as follows:—Notwithstanding the increase in the cultivation of hemp and flax since the commencement of the present century, a large quantity of textile filaments are still imported into France from foreign countries, which filaments are not all hemp and flax. For instance, the fibres of Phormium Tenax or New Zealand flax have been, for some years past, introduced into certain fabrics. This has been done to a great extent with sail-cloth, and other fabrics required for the equipment of vessels, as well as for other government purposes —whereby a deception has been practised, and that of a serious nature.

It is not that the price of the New Zealand flax is much less than hemp, but its quality as a textile substance is evidently greatly inferior. Experience has shewn the fallacy of the expectations which were entertained regarding the utility of New Zealand flax. According to M. Vincent, fabrics made of this substance are soon spoiled by the action of ley; and the threads become so much weakened by exposure to heat and damp as to be very easily broken.

From this will be seen the importance of a process which shall discover the presence of any textile substances other than hemp and flax in woven fabrics. In studying comparatively the action of various chemical agents on the fibres of flax, hemp, and phormium tenax, M. Vincent found that the reaction of nitric acid furnished a means of distinguishing the phormium tenax from other substances.

By repeating the experiments described in the memoir submitted for their examination, the Commission ascertained the following facts:—The threads of hemp, on being immersed during some seconds in ordinary nitric acid, assume a pale yellow tint; the threads of flax are not affected, but the phormium tenax immediately acquires a blood-red hue. M. Vincent attributes this to the presence of an azotous substance in the phormium tenax, which does not exist in the hemp and flax prepared by the retting process. It is well known that the phormium is not prepared by the retting process, but that this is done by a mechanical process similar to combing. However this may be, this property of becoming colored by the acid is not altered by bleaching or dressing. Thus, a coarse fabric used for making the convicts' shirts, and known to contain phormium, was immersed in nitric

acid; the weft threads quickly assumed a blood-red color, whilst the warp threads were not affected. The fabric, on being taken from the acid liquor, presented the appearance of red and white chequering.

The Commission thought fit to enquire whether bleaching the fabrics more perfectly would not cause the property by which the phormium tenax is discovered to disappear; and for this purpose a sample, made of mixed threads, was steeped in an alkaline liquor, containing three per cent. of caustic soda. The first leys acquired a decided brown tint; this washing was continued hot during two days; after this operation, the fabric when put in the acid was acted upon in the same manner as before the action of the ley,—the weft threads acquiring a red tint.

The comparative experiments of M. Vincent were confined to the three textile substances above mentioned, as the principal object of his experiments was to shew the phormium which had been fraudulently introduced into the fabric. The Commission, however, wished to ascertain whether other threads besides those extracted from the phormium, possessed the property discovered by M. Vincent. He experimented upon the ligneous and cortical fibres of two sorts of cocoa trees (*cocos nucifera et aurara*); several sorts of *Pandanus;* several sorts of *Cordyline;* the *Mauritia flexuosa;* several sorts of *Agave;* the *Phellandrium aquaticum;* several sorts of *Cissus;* the *Raphanus satirus;* the *Abaca of Manilla;* two *Postras* of Brazil, &c. All these ligneous fibres acquired reddish tints on coming into contact with the nitric acid; but its action was particularly noticed upon the *abaca* and the *pita of agave,* which are textile matters very much appreciated in the countries which furnish them.

The *pita,* on being immersed in nitric acid, acquired a pale pink tint; the color of the *abaca* was a little deeper than that of the *pita,* but these two tints were not to be compared, as regarded intensity, with the blood-red color acquired by the phormium under the same circumstances.

The Commission thinks, therefore, that even if, as M. Vincent has stated, nitric acid will discover phormium tenax when mixed with hemp or flax, yet that it will not do this with certainty, as the textile fibres of several other plants of the monocotyledon and dycotyledon order also possess, in different degrees, the property of coloring under the influence of that acid. M. Vincent's process, however, fully answers the purpose of the government, by furnishing a prompt and easy method of ascertaining whether a fabric does not contain other matters besides flax and hemp.

M. Vincent's work besides contains interesting observations on the preparation of textile substances, and accounts of numerous experiments on the action of several re-agents on the same substances. The Commission has therefore the honor of proposing to address thanks to M. Vincent for his interesting communication.—[*Ibid.*]

ACCOUNT OF A NEW SAFETY APPARATUS TO BE USED IN CASES OF SHIPWRECK,—PRESENTED TO THE "ACADEMIE DES SCIENCES," BY M. DELVIGNE, AND CALLED THE "CABLE CARRIER."

MANY attempts have been made to establish a communication at a distance between a shipwrecked vessel and the shore, or from one vessel to another. Amongst others, Captain Manby (an Englishman) proposed to throw a rope, by attaching it at one end to a shell, which was propelled from a mortar; but this contrivance does not answer well, as the rope is liable to break from the velocity of the projectile. The throwing of the shell is, besides, not unattended with danger; and the wind offering considerable resistance to the rope, great deviations from the right course are liable to occur: another disadvantage is, that if the shell falls short of the mark, it sinks in the water, dragging the rope of course along with it to the bottom.

In order to remedy these evils, instead of throwing the rope by means of a shell from the mortar, M. Delvigne has invented a projectile for that purpose, consisting of a hollow wooden cylinder, inside which the cord is wound; on this being thrown from a mortar or carronade, or other suitable gun, the rope will be rapidly unwound, as it proceeds, and the hollow wooden cylinder will carry the rope to the place where assistance is required. If it misses or falls short of the mark, the hollow cylinder will float near the vessel, and serve as a buoy.

M. Delvigne says he is indebted to the Minister of Marine for having been enabled to try his plan with various kinds of fire-arms; and he has no doubt of being able to establish a communication with great facility, either from vessel to vessel—from a vessel to the shore—or from the shore to a vessel, by means of his "cable-carrier."

In the experiments made at Lorient, by order of the Minister of Marine, the average distance travelled by the "cable-carrier," thrown from a mortar of 15 centimètres* (calibre 24), at an angle of 25 degrees, was 250 mètres,† its weight was 7.500 kilogrammes (15lbs.), and the charge of powder used was 160 grammes.‡ With a carronade of 30 calibre, the distance was 320 mètres at an angle of 14 degrees, and 385 mètres at an angle of 19 degrees. The cable-carrier weighed 10 kilogrammes (about 20lbs.), and the charge of powder employed was 250 grammes.

It was feared that a side wind would cause the rope to deviate considerably from its course; but experience has proved that this was not the case. The rope, acted upon by the wind, exercising a slight action upon the hinder part of the projectile, causes its

* The French centimètre is about equal to ⅓ of an inch Eng.

† The mètre is equal to about 39 inches Eng.

‡ The gramme is equal to 15.444 gr. Eng.

point to incline a little towards the wind, and compensates for its action.

Preparations are now being made to experiment with a "cable-carrier," of a calibre of 80 with Paixhan's cannon, and a mortar of 22 cent., with which the inventor hopes to attain a distance of 500 mètres.—[*Ibid.*]

OBSERVATIONS UPON THE DEVELOPMENT OF ELECTRICITY IN BANDS OF LEATHER.

BY JOHN M. BATCHELDER.

HAVING had an opportunity to examine the electrical condition of the bands of a cotton-mill, and finding them very highly excited, many interesting facts were brought out, which I here detail.

The mill is situated on the sea-coast of Maine, where the climate is very moist, and consequently less favorable for the development of electricity than the dry and elevated lands of the interior of the country. There are several hundred bands in a mill, all of which are electrically excited in a greater or less degree; those which turn upon wooden drums or pullies, whereby they are partially insulated, become very highly charged; the intensity of the excitement being much increased by the crossing of the band, the transmission of power, and a high velocity.*

The one which was used for making most of the experiments detailed below is about thirty-five feet in length, nine inches wide, and moves sixteen hundred feet per minute, passing around two wooden drums, which revolve upon an iron shaft one hundred and eighty times per minute; and in clear weather a spark may be taken on the knuckle held below the band at a distance of one foot and five inches. Owing to the imperfect conducting power of the leather, this discharge is local; were it to take place from all parts of the excited surface at the same instant, it would be unsafe to discharge it in this manner. On presenting the end of the finger, the striking distance is found to be three feet; the point of a black lead pencil shews a distinct brush when held in the hand four feet from the band; and a steel point becomes luminous at the distance of seven feet. When the bands are in this condition, the first processes of the cotton manufacture are attended with serious inconvenience; the fine filaments of the cotton repel each other, causing a great deal of waste; and, in several instances, the "drawing," as it is termed, has been lifted from the machine to a band four feet distant from it. These difficulties are now partially removed, by extending a conductor of wire to an iron steam-pipe, which passes through the rooms, and by emitting jets of steam near those bands that

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* Dr. Franklin suggested to his friend, Mr. Bowdoin, that a portable electrical machine might be constructed by making the cylinder of leather, stuffed and properly mounted.

are most highly charged. It is probable that the finest kinds of yarn can never be profitably manufactured in this country, the moist climate of England being much more favorable for this branch of the trade.

Let a piece of leather, about two feet in length, with one edge slightly curved, be presented to the band, and a succession of brilliant flashes and jets is immediately produced, giving a very perfect imitation of the Auroral light. While engaged in this experiment, I noticed that, in some cases, the current of electricity continued to flow in the direction, first established, even when a substance of the same conducting power is held nearer to the excited band; for instance, if a piece of leather be bent like a horse-shoe, and the extremities be brought towards the band in such a manner that a pencil of light may be seen passing to *one* extremity, and then the leather be so inclined that the distance from the *other* extremity to the band is but half the distance of *that* receiving the electricity, the jet still continues to flow in its first direction, in preference to taking the shorter path offered by the opposite end. There is evidently a tendency in the fluid to follow in the direction first commenced.

For the purpose of ascertaining whether metallic particles would become luminous in an atmosphere highly charged with electricity, very minute particles of metallic dust were projected against the belt, but I was unable to detect any light either during their ascent or descent. The passage of a jet of steam through the same atmosphere was not attended with light.

Let two imperfect conductors be placed at equal distances from the band, their points directed towards it, and separated a few inches from each other, then if air be blown violently from a glass tube upon one of the jets, it will disappear; the other now conveying a larger quantity of the fluid becomes brighter; let the tube be directed to this and it is extinguished, the light appearing again upon the first, thus changing from one to the other as rapidly as the tube can be moved.

It hence appears probable, that the flickering of the Auroral columns may, to a certain extent, be attributable to the motion of the air.—[*Silliman's Amer. Jour. for March,* 1847.]

THE DEGREES OF PROTECTION AVAILABLE TO THE INVENTOR UNDER THE PATENT LAWS AND NON-ORNAMENTAL DESIGNS ACT, RELATIVELY CONSIDERED.

It must be well known to most of our readers, that within these few years several Acts have been passed for creating a copyright in designs of an ornamental character, which could not previously be secured to the ingenious originator; and also for increasing

the period of protection to other designs. The favor with which these amendments in the law of copyright were received, may be inferred from the fact of a public testimonial having been presented, by some of the most eminent manufacturers of the North of England, to the gentleman who was mainly instrumental in carrying out these enactments. The success of the experiment of granting copyrights for ornamental designs no doubt suggested the practicability of extending such protection to articles of a strictly useful character; but it was not long after these Acts came into operation, that the *necessity* for a further step became evident; and the eagerness with which inventors brought such incongruous articles as screw-wrenches, barrel-organs, fire-escapes, &c., for registration under the *Ornamental* Designs Act, clearly indicated the direction in which the next advance in copyright protection must tend. What may have been the impetus which prematurely drove through parliament that crude piece of legislation termed the Non-ornamental or Configuration Act, it is not our business to enquire; but of this we are satisfied, it would puzzle the greatest adept in law records to furnish a parallel, in any other Act of any session of parliament, to this for meagreness of description, as to its purport and bearings; it is as it were nothing but dry bones, which present a picture as intelligible to one ignorant of anatomy as this Act to a person who has not given it his most careful attention. The remarks which have from time to time been put forth for the guidance of the inventor through this mysterious labyrinth to protection, have been most ludicrously contradictory, and have served, if possible, to make an unintelligible Act still more obscure. We do not say this in utter disparagement of the Act, for if it has no defined limits—like too many estates—still it is a possession, and one that we can enjoy (though perhaps not with much comfort) until dispossessed by some decision of the judges, or by the repeal of the Act itself. In anticipation of the amelioration which sooner or later must be made in the copyright laws, we would call attention to the incompatibility of the working of any law containing the elements of the Non-ornamental Designs Act with that of the patent laws, as they at present exist. So long as copyright was confined to the protection of things essentially distinct from *invention* (in its mechanical acceptation), no difficulty could arise; but now that two laws, essentially different in their administration, are (although in a limited degree) working towards the same object independently of each other, nothing but confusion can ensue, and the evidence of this is daily becoming more evident.

We may here state, without entering into an analysis of the different kinds of protection obtainable under the Patent Laws, and by registration under the Non-ornamental Act, that some inventions may with propriety be secured under either statute; but the general practice of inventors is to ascertain, first, the

probable success of their improvement, and then to determine, by balancing the duration of protection with the relative differences in the fees, whether the invention is a proper subject for registration or for a patent. This is of course a very unsatisfactory result in a legal point of view, but it will serve to shew the ignorance which prevails on the subject.

It will be remembered, as one peculiarity of the English Patent Law, that the exclusive right of granting patents for invention is vested in the Crown; applications for such grants must pass through a number of ancient forms before the required protection is obtained:—the time consumed in going through this process is about a month. On the other hand, when a copyright is required, the design is deposited with the registrar, and, if approved of, it bears date the day following its deposit. Again, when a patent is obtained, six months are allowed to prepare the specification; but in the case of a registration, the specification is lodged at the time of making the application, and the design is immediately accessible to the public.

Now, in all legislation which tends to the rewarding of skill and ingenuity, it is especially necessary to provide that the true and first inventor shall be the recipient of the gifts which are bestowed for his labors; through these two jarring laws, however, both of which are intended for his advantage, he not only runs the chance of losing all interest in his ingenuity, after having strictly conformed to the demands of the law from which he sought protection, but he is also under the comfortable assurance of being liable to a prosecution, for daring to carry out the invention which he fondly hoped he had secured for his individual advantage. This assertion, which we make advisedly, may be thought to have some reference to chicanery, or advantages attainable through the intricacies of law; we are not, however, considering what may be done by cunning and dishonesty, but what injustice the natural working of the Patent Laws and Registration Act is likely to produce, when there is an absence of all unfairness in the motives of the parties concerned. As an example (the first on record) of the false position in which an inventor may stand, after having *secured* his improvement by registration under the Configuration Act, we may instance the case of Brett *v.* Massi (reported at p. 357), which was a motion before the Vice-Chancellor to restrain the defendant from using a certain description of galvanic trough or battery, applicable to electric telegraphs and other purposes. The plaintiff it appeared had obtained an English patent for various improvements in electric telegraphs and apparatus pertaining thereto on 11th February, 1847, and on the 16th of the same month the defendant registered what he termed, "a percolating battery," and thereby supposed himself protected for three years in the sole making of such battery in the United Kingdom of Great Britain and Ireland. This improvement the plaintiff claimed as part of his invention

(which has to be specified in August next), and the defendant not being in a position to prove that his battery was in actual operation before the date of Brett's patent, is now deprived of the use of his invention; and must cancel a profitable arrangement, which, in the preceding month of January, he had entered into with the electric telegraph company, to provide them with batteries of the new construction. We have no reason to suppose that either party in this case was acquainted with the existence of the other's invention, until the curiosity of the plaintiff was excited to know the nature of the defendant's design, which was open for inspection at the registration office; and we are therefore bound to consider, while looking at the case as presented before the Vice-Chancellor, that both parties were original inventors. As a matter of right, it follows, that he who has secured the prior date of protection must take precedence; but it is a poor consolation for the defeated expectant of fortune, to feel that the evidence of his interested and successful rival is the only proof of his invention having been anticipated. If we trace this matter further, and suppose (which is very likely to be the fact) that Brett's Irish and Scotch patents are of a later date than Massi's registration, the matter of right is here reversed, and Brett will lose so much of his invention in those countries, as refers to the percolating battery, which is secured to Massi; unless, indeed, the prior date of Brett's patent vitiates the registration altogether; in which case, the question arises as to its being public property in Ireland and Scotland.

From the above explanation it will be readily seen what great injustice may be effected by patentees whose ideas of *meum* and *tuum* are not very strongly defined,—for a specification may become a safe receptacle for all the little notions which, on a given subject, have been registered within the six months elapsing from the sealing of a patent to the enrolment of the specification; the title of the patent being of course of such a nature as to embrace the registered improvements. By this means the several proprietors of the designs so absorbed are deprived of all right and title to their ingenuity, and whatever advantages, in point of convenience or economy, might result therefrom, are witheld from the public for a period of fourteen instead of three years. That this mode of peculation has already been carried out to some extent, we have good grounds for supposing; but examples, for obvious reasons, cannot be given.

It is not, however, merely on the inventor who seeks protection under the Registration Act, that this injustice will fall,—the patentee is not exempt from suffering under similar spoliation. We must not be supposed to be imagining an impossible or even an unlikely case, when we state that a person who, having surreptitiously obtained a knowledge of an invention, and fruitlessly attempted to secure it to himself by patent, may turn to the Registration Act for protection; while the real

inventor (whose patent had perhaps passed the stages of opposition before his opponent was possessed of the invention) finds by the time that his patent has arrived at the Great Seal, that he is anticipated by a registration, which, if it does not give any real security to its nominal proprietor, throws the invention open to public use.* Instances of persons registering inventions for which patents have been refused are numerous; but we do not feel at liberty to place our private knowledge of such matters on record. The fact of such things having been done is sufficient evidence to shew the imperfection of the existing laws for protecting the ingenuity of that branch of the industrious community, from whom the wealth and prosperity of the country mainly spring; and if our endeavours to lay open the incongruous workings of the Patent Laws and Configuration Act for articles of utility shall avail to fix the attention of the legislature on the subject, we doubt not, that the advice of gentlemen well versed in such matters will not be wanting to assist in the formation of a judicious code, which will effectually guard the honest inventor from depredation, and at the same time secure the public from designing speculators.

REPORT OF AMERICAN PATENTS.

From the "Journal of the Franklin Institute."

BY MR. C. M. KELLER.

To THEODORE ELY, *New York, for improvements in the cotton gin.*

THE patentee says:—"Much difficulty has been experienced in ginning the long staple cotton, from the tendency of cutting or breaking and heating the fibres, results so injurious to the staple —the value of which depends on the length and entirely and perfectly natural condition of the fibres. The most general mode which has been resorted to for the effectual ginning of the long staple cotton is the use of rollers, which draw the fibres and separate them from the seeds. These rollers have been made of various substances, such as metal, wood, cork, stone, &c., with their surfaces smooth, fluted, indented, &c.; but all these, so far as I am informed, have failed in giving satisfactory results. Those made of wood have so far been the most successful, but in a very short time they become rough, and injure the staple; and have, therefore, frequently to be renewed. And even these only succeed when the cotton is fed in by the hand of an attendant,

* As this point has never been brought under discussion, it is yet uncertain how such publication might be viewed by the Courts; the above is given as the generally received opinion.

who, with his fingers, properly loosens and distributes the pods. The metal rollers, in consequence of the smoothness of metal surfaces, have to be fluted, or otherwise indented, that they may take sufficient hold of the fibres to draw them through; and as these, thus formed, tend at times to draw in too much cotton at once, together with the seeds, the two rollers must be pressed together by extra force, such as weights or springs, which additional pressure tends to heat the rollers, and thus to injure the staple. Rollers made of other substances have, for like and other causes, not necessary to enumerate, failed to produce the results anticipated and required.

"All the kinds of rollers which have been used tend to 'lap the cotton,' as it is termed; that is, the fibres adhere to and are wound around the rollers. These defects in the operation of roller-gins arise from the fact that the cotton is not properly loosened preparatory to being submitted to the action of the rollers, and because these (the rollers) have not been made so as to avoid heating and griping the fibres, and from their arrangement and action on each other, the surfaces which act on the fibres are so brought together as necessarily to injure each other. The object of my improvements is to avoid all these defects, and they consist in the following devices, viz:—in the employment of a toothed roller, which takes the cotton from a feeding-board or apron, and carries it around, properly distributed, to the action of a rotating beater, which whips it, and loosens the pods, and blows them in regular quantities down an inclined board to the bite of the two separating or ginning-rollers, which are made slightly fluted or grooved in lines parallel with their axes, the better to catch and hold the fibres; but, to prevent the bad tendency which has always been experienced in the use of fluted metallic rollers, the flutes or grooves do not extend their whole length; the ends being left perfectly smooth for a short distance, so that the edges of the flutes of the one shall not enter the recesses of the other, or catch and cut the fibres,—this being prevented by the smooth surfaces at the ends, which roll on each other. And the tendency to cut, and tear, and injure the fibres by the heating of the rollers is also avoided, by dispensing with the additional pressure, heretofore used, so long as the proper quantity of cotton is presented to the action of the rollers, and these do not draw in too much; but when this does take place, then their bearings, or the sliding-boxes in which they work, are brought into contact with weighted levers, springs, or other analogous device, properly gauged, to bring them into action before the rollers shall have been sufficiently separated to permit the entrance of seeds. The rollers are relieved of this additional pressure the moment the overcharge of cotton ceases, for then the weighted levers or springs are arrested by the gauges.

"And the lapping of the cotton around the rollers is avoided by means of additional rollers, placed in front of, and in contact

with, the ginning-rollers; the surfaces of the two sets, where they come in contact with each other, moving in opposite directions, to strip the ginning-rollers of any fibres which may have a tendency to adhere to them.

"These improvements I have effectually tested by a long series of experiments, and the cotton is not only ginned with greater rapidity, but the fibres are delivered in as perfect a condition as if separated by hand."

Claim :—"What I claim, as my invention, is making the ends of the fluted, grooved, or ridged ginning-rollers, without the flutes, grooves, or ridges, so that they shall run on each other, and thus prevent the injurious action of their parts operating on each other, and on the fibres of the cotton, as described.

"I claim the rotating, stripping, or cleaning-rollers, in combination with the ginning-rollers, for the purpose and in the manner substantially as herein described.

"I also claim the feeding-roller and beater or blower, in combination with the ginning-rollers, for the purpose of loosening the cotton, and presenting it to the action of the ginning-rollers, as described.

"And, finally, I claim the beater or blower, in combination with the ginning-rollers, for the purpose and in the manner described."

To Walter Hunt, *of New York, for a filter for inkstands.*

The claims in this invention are confined to the filter-tube, in combination with the funnel, plunger, spring, and perforated bottom, arranged substantially in the manner and for the purposes described.

The filter tube extends from the funnel-shaped ink-tube at the top to within a short distance of the bottom, to permit the ink to rise through a hole in a cork at the bottom. Above this cork the ink has to filter through a sponge to supply the chamber above. The lower end of the funnel-shaped ink-tube is provided with a small funnel-shaped piece, which is forced up by a spiral spring, and provided with an aperture filled with sponge. When the pen is dipped, the part last described is borne down to admit ink from the filter-tube, the sponge in the dipping-tube permitting the ink to flow back, at the same time excluding the air.

To Richard Hemming, *of Boston, Massachusetts, for an improvement in the method of attaching printing types to a cylinder.*

The patentee says :—"This invention consists simply in making the types with a recess in one face of the body or shank, to receive a rule, or strip of metal, which is laid in after a whole range of types has been set up; the ends of the rule project beyond the range sufficiently to be secured by a slide or cap-plate

attached to the cylinder. From this it will be obvious that no one type can rise above the range without cutting off the rule, a number of them cannot rise in a curve without bending the rule, and the whole range cannot rise because the ends of the rule for each range are held down by the slides or cap-plates."

"He claims the method of retaining types in their proper relative positions on a cylindrical bed by means of rules or strips of metal, or other appropriate substance, fitting into recesses made for that purpose in the body or stem of types."

To JOHN ALLEN, *of Cincinnati, Ohio, for a method of restoring the fullness or roundness to the cheeks.*

THE patentee claims, as his invention, and desires to secure by letters patent, restoring hollow cheeks to their natural contour and rotundity by means of metallic bulbs, formed, fitted to, and secured in the mouth, by any suitable attachment between the jaw-bones and the cheek.—[No account has yet reached us of the reception which this extraordinary invention has met from the faded beaux of the Western World, but whatever may be its success, Mr. Allen will have the proud satisfaction of feeling that "in great attempts 'tis noble e'en to fail."]

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1847.

Apr. 28. *Joseph Ridsdale*, of 54, Minories, London, for a signal-lamp or lantern.

28. *Samuel Baekler*, of 4, Cambridge-terrace, Islington, for a spatula.

28. *Felix Abate*, of London, Neapolitan civil engineer and architect, for an elastic wheel for railway and common carriages.

May 1. *Webb & Skinner*, of 119, Union-street, Southwark, mill-makers, for a connection or fastening for attaching fly-wheels to mills.

1. *John Nelson*, of Highfield, Sheffield, for parturition forceps.

1. *J. Blissett*, of 316 and 321, High Holborn, for a breach-plate or sight-piece of an air-gun stick.

3. *Alexander Williams*, of 15, Seething-lane, Tower-street, London, wine-cooper's stool manufacturer, for an improved corking machine.

5. *Charlton Brothers*, of 27, Lionel-street, Birmingham, for an improved castor, with screwed pin.

May 5. *James Allan, sen.*, of 84, Buchanan-street, Glasgow, for an Archimedean chimney cowl.

5. *Peter James Kirby*, of 103, Newgate-street, London, pin manufacturer, for a toilet pin-box.

5. *William John Bowden*, of Ware, Herts, surgeon, for an improved pneumatic inhaler.

6. *Barrett, Exall, & Andrewes*, of Reading, Berks, agricultural implement-manufacturers, for a wrought-iron circular harrow.

6. *Charles Chapman Clark*, of Hammersmith, London, and Reading, Berks, for a self-acting valve for preventing escape of effluvia from drains.

7. *Andrew Lamb*, of No. 1, Beckford-terrace, Southampton, engineer to the Steam Navigation Company, and *John White*, of Medina Docks, West Cowes, Isle of Wight, ship-builder, for a sea-going life-boat.

7. *James Balthazar Ziegler*, of 26, Gillingham-street, Pimlico, for a valve perfecting slide for cornets, &c.

8. *Thomas Bullock*, of Cliveland-street, Birmingham, for an improved raised perforated shank for horn and other buttons.

10. *Peter Esdaile Bearblock*, of Lilliput, Hornchurch, Essex, for the small farmer's Hornchurch hand sowing-machine.

11. *George Hurwood*, of Ipswich, for a ventilator.

13. *Henn & Slater*, of Birmingham, for a spring or fastening for runners for umbrellas and parasols.

13. *Henn & Slater*, of Birmingham, for a spring or fastening for runners for umbrellas and parasols.

14. *William Dray*, of 86, Chiswell-street, ironmonger, for a universal dovetailed fastening for corkscrews.

15. *Samuel Messenger*, of Birmingham, for a buffer and railway lamp.

17. *Henry Skinner*, of 119, Union-street, Southwark, and *John Jasper Gerlach*, of 36, Thomas-street, Hackney, for a ventilating hat.

17. *William S. Burton*, of 39, Oxford-street, for a sponge-bath.

17. *Henry Fogden*, of Pagham, Sussex, for an improved horse hoe.

18. *Rider Brothers*, of 61, Redcross-street, Soothwark, for a hat-leather or round.

19. *Joseph Tylor*, of Warwick-lane, Newgate-street, London, for a protector engine.

19. *Welch, Margetson, & Company*, of 134, Cheapside, for the aerial stock.

May 19. *Joseph Schofield*, of Bradford, Yorkshire, for the pessary for *prolapsus uteri*.

19. *James Chesterman*, machinist, and *John Grattan*, cabinet case-maker, both of Sheffield, for a portable travelling-case.

21. *E. L. Simmons*, of Coleman-street, London, for an improved portable hygrometer.

21. *George Inman*, of 121, High-street, Poplar, joiner, for an improved compass plane.

25. *William Waterhouse Cutts*, of Sheffield, for a guard or police signal-lamp or lantern.

25. *Winsor & Newton*, of No. 38, Rathbone-place, artists' colormen, for a tray or case for holding chalks and crayons.

25. *Alexander Weston*, of Liverpool, for an air churn.

25. *Thomas Howarth*, of Stoney Holme, Burnley, for an improved temple.

26. *John James*, of 14, John-street, Oxford-street, for a traveller's boudoir or dressing-case, escritoirs, drawers, &c., combined.

28. *Charles Rowley*, of Birmingham, for a cigar tender and lighter.

28. *Joseph Gardner Stutterd*, of Banbury, for an improved mangle.

List of Patents

Granted for SCOTLAND, subsequent to April 22nd, 1847.

To John Coates, of Seedly, in the county of Lancaster, calico printer, for certain improvements in machinery or apparatus for cleaning the surface of woven fabrics, or freeing the same from fibrous or other loose matters previous to printing thereon.—Sealed 29th April.

Joseph Woods, of Bucklersbury, London, engineer, for certain improvements in springs for supporting and resisting sudden and continuous pressure; being a foreign communication.—Sealed 30th April.

Louis S. Gorien, manufacturer, of Paris, for improvements in printing stuffs, paper, and other matters.—Sealed 4th May.

Philip Barnard Ayres, of No. 12, Howland-street, Fitzroy-square, London, Doctor of Medicine, for certain plans and improvements in preparing putrescent organized matters, such as night

soil, the matter in suspension in the water of sewers, and other similar matters, for the purpose of manure or for other purposes; and for apparatus for the same.—Sealed 4th May.

George Copland, of 37, Frederick-street, Edinburgh, for an instrument or apparatus for measuring the human body, for the purpose of fitting garments with ease and accuracy, without reference to the proportions of the breast and shoulder measures, and which invention he names the *Corporimensor*.—Sealed 5th May.

Thomas Waterhouse, of Edgeley, Stockport, in the county of Chester, cotton manufacturer, for certain mechanical improvements applicable to railway engines and tenders, and to railway carriages of various kinds.—Sealed 8th May.

Maximilian François Joseph Delfosse, of Regent-street, London, for improvements in preventing and removing incrustation in steam-boilers.—Sealed 13th May.

Conrad Haverkam Greenhow, of North Shields, for improvements in the construction of ships or vessels, and in propelling ships and vessels.—Sealed 14th May.

Samuel Hardacre, of Manchester, machinist, for certain improvements in machinery or apparatus for opening and for carding cotton and other fibrous substances, and for grinding the cards of carding machines.—Sealed 17th May.

George Benjamin Thorneycroft, of Wolverhampton, iron-master, for improvements in the manufacture of rails for railways.—Sealed 18th May.

Gardner Stow, of King-street, Cheapside, London, for improvements in the construction of steam vessels, and in apparatus for propelling ships and other vessels; being a foreign communication.—Sealed 18th May.

New Patents
SEALED IN ENGLAND.
1847.

To Robert Broad, of Tipton, in the county of Stafford, engineer, for improvements in railway turn-tables. Sealed 28th April—6 months for inrolment.

Richard Archibald Brooman, of Fleet-street, patent agent, for certain improvements in railway turn-tables; being a communication. Sealed 29th April—6 months for inrolment.

John Spear, of Gloucester-road, Hyde Park Gardens, Gent., for improvements in piano-fortes, and the musical scale of notes in use for such instruments; and also in apparatus to facilitate the action of the fingers on the keys of piano-fortes. Sealed 29th April—6 months for inrolment.

William Carter Stafford Percy, of Manchester, for improvements in machinery for making and dressing bricks, and in certain sheds and kilns in which bricks and tiles are dried and burnt. Sealed 29th April—6 months for inrolment.

John Elce, of Manchester, machine-maker, and Richard Bleasdale, of Rochdale, in the county of Lancaster, for improvements in machinery for preparing and spinning cotton, wool, and other fibrous substances. Sealed 4th May—6 months for inrolment.

Conrad Haverkam Greenhow, of North Shields, Gent., for improvements in the construction of ships or vessels, and in propelling ships and vessels. Sealed 4th May—6 months for inrolment.

William Henwood, of Portsea, in the county of Southampton, naval architect, for improvements in propelling vessels and in steering vessels. Sealed 4th May—6 months for inrolment.

Lemuel Wellman Wright, of Chalford, in the county of Gloucester, engineer, for certain improvements in machinery or apparatus for sweeping or cleansing chimneys, flues, and other similar purposes. Sealed 4th May—6 months for inrolment.

Gardner Stow, of King-street, Cheapside, Gent., for improvements in the construction of steam-vessels, and in apparatus for propelling ships and other vessels. Sealed 4th May—6 months for inrolment.

William Newton, of the Office for Patents, 66, Chancery-lane, Middlesex, civil engineer, for improvements in machinery for letter-press printing; being a communication. Sealed 4th May—6 months for inrolment.

Joseph Taylor, of Tipton, in the county of Stafford, engineer, for a certain improvement or certain improvements in the construction and manufacture of wheels for railway and other carriages. Sealed 4th April—6 months for inrolment.

Fennell Allman, of Charles-street, St. James's-square, consulting engineer, for an improved mode of making, forming, or shaping candles. Sealed 4th May—6 months for inrolment.

John Horsley, of Ryde, Isle of Wight, practical chemist, for improvements in preserving animal and vegetable substances. Sealed 6th May—6 months for inrolment.

Robert Spencer, of Lloyd-street, Lloyd-square, Middlesex, civil engineer, *for* certain improvements in machinery for planing and sawing wood; parts of which improvements are applicable to machinery for cutting certain other substances. Sealed 6th May—6 months for inrolment.

Moses Poole, of the Bill Office, London, Gent., for improvements in apparatus for connecting and disconnecting railway carriages; being a communication. Sealed 6th May—6 months for inrolment.

Charles Fox, of No. 3, Trafalgar-square, Charing-cross, Middlesex, and John Coope Haddan, of Upper Woburn-place, civil engineer, for improvements in railway chairs and switches, in trenails or fastenings, and in machinery for preparing railway sleepers. Sealed 6th May—6 months for inrolment.

Johann Gottlob Seyrig, of New Lenton, in the county of Nottingham, engineer, for certain improvements in propelling on land and on water. Sealed 6th May—6 months for inrolment.

Isham Baggs, of Holford-street, Holford-square, Pentonville, Gent., for certain improvements in the production and management of artificial light. Sealed 7th May—6 months for inrolment.

Joshua Fielden, of Waterside, Todmorden, in the county of Lancaster, Esq., for an improved mode of laying and pressing cotton, silk, wool, flax, and other fibrous matters into cans, baskets, boxes, or other depositories. Sealed 8th May—6 months for inrolment.

Amos Bryant, of Heavitree, in the county of Devon, gardener, and Richard Tothill, also of Heavitree, surgeon, for improvements in preparing, constructing, and draining land, and an improved implement or implements to be used therein. Sealed 8th May—6 months for inrolment.

William Norman, of Paradise-place, Finsbury, cabinet-maker, for improvements in the construction of expanding or dining tables. Sealed 10th May—6 months for inrolment.

John Martin, K. L., of Allsop's-terrace, in the county of Middlesex, for improvements in apparatus and means used when draining cities, towns, and other inhabited places, and land. Sealed 10th May—6 months for inrolment.

John Tattersall Cunliffe, of Manchester, hide merchant, for certain improvements in "pickers" for power looms, and also in the tools or apparatus for manufacturing the same. Sealed 14th May—6 months for inrolment.

John Thomas Gray, of Wardour-street, Middlesex, boot-maker, for an improved boot and shoe. Sealed 14th May—6 months for inrolment.

Thomas Shipp Grimwade, of Sheepcote Farm, Harrow on the Hill, Middlesex, farmer, for a new mode of treating milk for purposes of nutriment. Sealed 14th May—6 months for inrolment.

Thomas Hazeldine, of Brudenell-place, New North-road, Middlesex, engineer, for improvements in the construction of furnaces. Sealed 18th May—6 months for inrolment.

Richard Peyton, of the Bordesley Works, in the county of Warwick, metallic bedstead manufacturer, and Jonathan Harlow, of Bordesley Works, aforesaid, and Thomas Horne, of the Borough of Birmingham, brass founder, for improvements in the manufacture of bedsteads. Sealed 18th May—6 months for inrolment.

Henry John Nicoll, of 114, Regent-street, Middlesex, tailor, for improvements in garments, and in pockets, bags, and other receptacles. Sealed 22nd May—6 months for inrolment.

Sydney Smith, of the town and county of the town of Nottingham, engineer, for a certain improved apparatus for determining the pressure of steam in boilers, and regulating the dampers of a furnace. Sealed 22nd May—6 months for inrolment.

William Bridges Adams, of Old Ford, in the county of Middlesex, engineer, and Robert Richardson, late of Manningtree, in the county of Essex, but now of Hadleigh, in the county of Suffolk, civil engineer, for certain improvements in the construction of railways, and of engines and carriages used thereon; and also in transport and storage arrangements for the conveyance, management, and preservation of perishable articles. Sealed 22nd May—6 months for inrolment.

Moses Poole, of the Bill Office, London, Gent., for improvements in the construction of pneumatic springs and presses; being a communication. Sealed 22nd May—6 months for inrolment.

Jean Marie Fourmentin, of New Bridge-street, Blackfriars, Gent., for improvements in the manufacture of carbonate of lead. Sealed 22nd May—6 months for inrolment.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, Middlesex, civil engineer, for a new or improved instrument or apparatus for making or manufacturing capsules for enclosing medicinal preparations, or other liquid or solid substances; being a communication. Sealed 22nd May—6 months for inrolment.

John Aitken, of Russell-street, Bermondsey, in the county of Surrey, leather-dresser, for improvements in steam-engines, atmospheric engines,—in distilling, and in pumping water. Sealed 22nd May—6 months for inrolment.

William Dyne, of Rochester-terrace, Stoke Newington, Middlesex, corn merchant, and Morys Haggar, of Church-street, Stoke Newington aforesaid, for certain improved apparatus for protecting life and property in cases of shipwreck. Sealed 22nd May—6 months for inrolment.

Charles Chinnock, of No. 52, Regent's Quadrant, Middlesex, for improvements in regulating motion and controlling friction in the joints and other parts of furniture, machinery, and carriages. Sealed 22nd May—6 months for inrolment.

Henry Le Lievre, of Cleveland-sereet, Mile End, Middlesex, for improvements in dyeing and stretching silk, and in finishing plush. Sealed 24th May—6 months for inrolment.

Pierre Armand Le Comte de Fontainemoreau, of South-street, Finsbury, London, for certain improvements in the machinery for cutting wood, and in laying and uniting veneers. Sealed 25th May—6 months for inrolment.

Christian Schiele, late of Frankfort-on-the-Maine, but now of Manchester, mechanician, for certain improvements in machinery or apparatus for condensing steam; which said improvements are also applicable to other similar purposes. Sealed 27th May—6 months for inrolment.

Alexander Allan, of Crewe, in the county of Chester, engineer, for certain improvements in turn-tables, to be employed on or in connection with railways; part or parts of which said improvements are also applicable to the construction of tubular boilers. Sealed 27th May—6 months for inrolment.

Henry Gilbert, of Marina, St. Leonard's, Surgeon, for improvements in apparatus for holding sacks, to facilitate the filling them with corn or other materials. Sealed 27th May—6 months for inrolment.

Henry Mc Evoy, of Hall-street Works, Birmingham, machinist, for improvements in the manufacture of, and in the packing hooks and eyes. Sealed 27th May—6 months for inrolment.

George Benjamin Thorneycroft, of Wolverhampton, iron-master, for improvements in the manufacture of rails for railroads. Sealed 27th May—6 months for inrolment.

James Johnstone, of Willow Park, Greenock, Esq., for certain improvements in the manufacture of sugar. Sealed 27th May—6 months for inrolment.

Reginald James Blewitt, of Llantarnam Abbey, Newport, in the county of Monmouth, Esq., for improvements in the manufacture of malleable iron. Sealed 27th May—6 months for inrolment.

List of Disclaimers
OF PARTS OF INVENTIONS AND
Amendments
MADE UNDER LORD BROUGHAM'S ACT.

Disclaimer allowed on the 25th September, 1846, (and filed with the Clerk of the Patents on the same day) to the specification of a patent granted to Alexander Parkes, of Birmingham, artist, for improvements in the preparation of certain vegetable and animal substances, and in certain combinations of the same substances alone or with other substances.—Dated 25th March, 1846.

Disclaimer and memorandum of alteration allowed on the 29th September, 1846, (and filed on the 1st October, 1846,) to the specification of a patent granted to John Harcourt Quincey, of Old-street, City-road, Gent., for improvements in the manufacture of blinds and shutters.—Dated 27th September, 1844.

Disclaimer and memorandum of alteration allowed on the 19th January, 1847, (and filed on the 22nd January, 1817,) to the specification of a patent granted to Thomas Aitken, for certain improvements in the machinery or apparatus for drawing cotton and other fibrous substances.—Dated 28th January, 1840.

Disclaimer and memorandum of alteration allowed on the 30th January, 1847, (and filed on the 1st February, 1847,) to the specification of a patent granted to William Costen Aitken, of Birmingham, for a certain improvement or certain improvements in ornamenting cornice ends for cornice poles and other rods, curtain-bands, and certain other articles.—Dated 3rd June, 1845.

Disclaimer allowed on the 15th February, 1847, (and filed on the 15th February, 1847,) to the specification of a patent granted to John Buchanan, of Queen-square, Westminster, for certain improvements in ships or vessels, and in the propelling thereof, and in securing the same from floatal damage; certain parts of which machinery may be used for motion on land.—Dated 15th August, 1846.

Disclaimer allowed on the 2nd March, 1847, (and filed on the same day,) to the specification of a patent granted to George Senior, of Bradford, in the county of York, Gent., for certain improvements in washing, cleansing, scouring, and bleaching silk, cotton, wool, and other fibrous substances generally; also in dyeing, combing, carding, spinning, felting, milling, or otherwise treating or preparing fibrous substances generally.—Dated 3rd September, 1846.

Disclaimer allowed on the 3rd March, 1847, (and filed on the same day,) to the specification of a patent granted to William Irving, for improvements in the construction of apparatus for cutting ornamental forms, beads, recesses, and mouldings in wood and other materials.—Dated 10th February, 1845.

Disclaimer and memorandum of alteration allowed on the 29th March, 1847, (and filed on the 30th March, 1847,) to the specification of a patent granted to Thomas Dunn, of Manchester, engineer, for certain improvements in, or applicable to, turn-tables, to be used on or in connection with railways.—Dated 13th March, 1845.

Disclaimer and memorandum of alteration allowed on the 29th March, 1847, (and filed on the 1st April, 1847,) to the specification of a patent granted to Samuel Ellis, of Salford, in the county of Lancaster, for certain improvements in weighing-machines, and in turn-tables, to be used on or in connection with railways, and in weighing-machines, to be used in other situations.—Dated 22nd June, 1843.

Disclaimer and memorandum of alteration allowed on the 1st April, 1847, (and filed on the 7th April, 1847,) to the specification of a patent granted to Edmund Tayler, of King William-street, in the city of London, Gent., for certain improvements in the construction of carriages used on railroads.—Dated 11th May, 1841.

Disclaimer and memorandum of alteration allowed on the 19th April, 1847, (and filed on the 20th April, 1847,) to the specification of a patent granted to Peter Bancroft, of Liverpool, in the county of Lancaster, merchant, for certain improvements in the method or process of refining and purifying animal and vegetable oils and grease.—Dated 25th February, 1846.

CELESTIAL PHENOMENA FOR JUNE, 1847.

D.	H.	M.	
1			Clock after the ⊙ 2m. 36s.
			☽ rises 10h. 2m. A.
			☽ passes mer. 1h. 41m. M.
			☽ sets 6h. 9m. M.
			Occul. ρ1 Sagittarii, im. 12h.30m. em. 13h. 44m.
3	6		☿ in conj. with Pallas
	8	38	♄ □ with the ⊙
4	11	46	☿ sup. conj. with the ⊙
	16	29	☿ in Perihelion
5			Clock after the ⊙ 1m. 48s.
	—		☽ rises morn.
	—		☽ passes mer. 5h. 16m. M.
	—		☽ sets 10h. 52m. M.
	15	40	♄ in conj. with the ☽ diff. of dec. 4. 53. S.
6	4	6	☽ in □ or last quarter
6	9	10	♂ in conj. with the ☽ diff. of dec. 4. 37. S.
7	13		☽ in Perigee
7	23	48	♅ in conj. with the ☽ diff. of dec. 0. 38. S.
10			Clock after the ⊙ 1m. 3s.
	—		☽ rises 2h. 19m. M.
	—		☽ passes mer. 9h. 40m. M.
	—		☽ sets 5h. 11m. A.
	9	35	☿ in conj. with ♃ diff. of dec. 1. 44. N.
12	22	47	♃ in conj. with the ☽ diff. of dec. 4. 34. N.
13	0	52	Ecliptic conj. or ● new moon
13	9	6	☿ in conj. with the ☽ diff. of dec. 6. 43. N.
15			Clock after the ⊙ 0m. 1s.
	—		☽ rises 6h. 29m. M.
	—		☽ passes mer. 2h. 12m. A.
	—		☽ sets 9h. 45m. A.
	0	12	☿ greatest hel. lat. N.
16	3	4	♀ in conj. with the ☽ diff. of dec. 7. 0. N.
			Occul. α2 Cancri, im. 9h. 57m.
	16	22	☿ in conj. with Ceres, diff. of dec. 1. 13. S.

D.	H.	M.	
18	—		Mer. R.A. 6h. 52m. dec. 24. 5[illegible]. S.
	—		Venus R. A. 8h. 46m. dec. 2[illegible] 4. N.
	—		Mars R. A. 0h. 7m. dec. 1. 5[illegible]. S.
	—		Vesta R. A. 12h. 49m. dec. [illegible] 48. N.
	—		Juno R. A. 19h. 23m. dec. [illegible] 18. S.
	—		Pallas R. A. 5h. 8m. dec. 0. 57. S.
	—		Ceres R. A. 6h. 43m. dec. 2[illegible] 17. N.
	—		Jupiter R. A. 5h. 52m. dec. 22 14. N.
	—		Saturn R. A. 22h. 59m. dec. [illegible] 23. S.
	—		Georg. R. A. 1h. 6m. dec. 6. 22. N.
	—		Mercury passes mer. 1h. 8m.
	—		Venus passes mer. 3h. 2m.
	—		Mars passes mer. 18h. 22m.
	—		Jupiter passes mer. 0h. 7m.
	—		Saturn passes mer. 17h. 12m.
	—		Georg. passes mer. 19h. 19m.
20			Clock before the sun 1m. 4s.
	—		☽ rises 11h. 47m. M.
	—		☽ passes mer. 5h. 57m. A.
	—		☽ sets 11h 57m. A.
	4	0	☽ in Apogee
	6	15	♃ in conj. with the ⊙
	7	32	☽ in □ or first quarter
21	14	19	⊙ enters Cancer, summer commences
24	15	15	♄ stationary
	21	0	♂ greatest hel. lat. S.
25			Clock before the ⊙ 2m. 8s.
	—		☽ rises 5h. 5m. A.
	—		☽ passes mer. 9h. 44m. A.
	—		☽ sets 1h. 42m. M.
28	1	23	Ecliptic oppo. or ○ full moon
30			Occul. κ1 Aquarii, im. 13h. 50m. em. 14h 25m.
	—		Occul. κ2 Aquarii, im. 14h. 26m.

The eclipses of the Satellites of Jupiter are not visible this month, Jupiter being too near the Sun.

J. LEWTHWAITE, Rotherhithe.

THE

LONDON JOURNAL,

AND

REPERTORY

OF

Arts, Sciences, and Manufactures.

CONJOINED SERIES.

No. CLXXXVII.

RECENT PATENTS.

To Gustaf Victor Gustafsson, *late of Sweden, but now of Warren-street, Fitzroy-square, in the county of Middlesex, engineer, for certain improvements in steam-engines.*—[Sealed 14th July, 1846.]

These improvements in steam-engines are embraced under four distinct heads: firstly, a mode of connecting the piston-rod of a steam-engine to the piston, which is effected by the employment of a ball-and-socket joint; secondly, the manner of keeping the packing of a piston tight within the cylinder, by the combined mechanical force of steam and metallic springs; thirdly, the construction of a moveable apparatus, to be adapted to the top cover or cap-plate of the cylinder, through which the piston-rod is to slide, and at the same time vibrate; and fourthly, a means of regulating the draft of the flues of the furnace, and consequently tempering the pressure of steam in the boiler or generator, and also giving such due notice of the state of pressure in the boiler as may prevent accidental explosion.

In Plate XVII., fig. 1, is a horizontal view of the working cylinder of a steam-engine; its cap or upper cover being removed, for the purpose of shewing the piston within; which piston is represented in horizontal section, or divested of its upper plate, for the purpose of exposing its internal construction to view. Figs. 2, and 3, are vertical sections, taken at right angles to each other, shewing the sectional form of the cylinder and the piston, with their appendages. In all these figures the similar letters of reference indicate the same parts. A, A, A, is the cast-iron cylinder, bored to its correct figure in the ordinary way. The peculiar construction of the cover or top plate of the cylinder will be described under the third head of the invention; the bottom of the cylinder, as also the induction and eduction passages, are made in the usual manner. B, B, is the piston, the skeleton of which is a frame, formed like a wheel, with arms, for the purpose of rendering it of light construction. In the centre of this piston-frame a hemispherical socket or cup *a, a, a,* is attached, which cup must be accurately turned and ground to fit a ball or hollow sphere D, D, made fast to the lower end of the piston-rod C. This rod, which is to be connected at its other end to the crank-shaft of the engine, may be solid, as shewn at fig. 2, or hollow, as at fig. 3, having shoulders *b, b,* to hold the ball securely when affixed to it. In the former construction, that is, where the piston-rod C, is made solid, the inventor prefers the spherical part or ball D, to be cast on to the lower end of the rod; but when a hollow rod is employed, the ball D, may be attached to the end of the rod by a plug *d,* screwed into it, as in fig. 3, or by any other convenient means. This hollow rod is considered to be suitable for marine engines, on account of its lightness. The globe or ball D, must of course be accurately turned to fit the socket *a, a*; and this ball, at the end of the rod, is confined in the centre of the piston B, by a hemispherical cap *e, e,* affixed to the socket, and to the frame of the piston, by bolts passed through flanges, as seen in fig. 2. This novel mode of attaching the rod to the piston of a steam-engine admits of the rod vibrating in the cylinder as the piston ascends and descends, and allows the piston-rod to assume inclined positions, corresponding to the throw

of the crank. Hence the stroke of the piston will act directly upon the crank, and avoid the necessity of a parallel motion apparatus, which is required when the piston-rod is enabled to move only in a perpendicular direction.

The frame or skeleton of the piston, formed as a wheel, with arms as above said, is best seen in the vertical section at fig. 3, in which it will be perceived that the hemispherical cup or socket *a*, *a*, constitutes the nave of the wheel, from whence the arms *f*, *f*, *f*, proceed; and these arms are strengthened by descending wings or flanges *g*, *g*, connected to the socket, and carry the outer ring or periphery *h*, *h*, *h*, of the wheel; which, together, complete the frame of the piston B. To the ring *h*, and also to the socket *a*, *a*, and cap *e*, *e*, are attached, by bolts or screws, the upper and under dished plates *i*, *i*, *i*, *i*, or covers of the piston; their outer edges extending beyond the frame or wheel, for the purpose of confining the metallic packing *k*, *k*.

The mode of constructing and giving effect to the metallic packing of the piston, which constitutes the second head of the invention, though seen partially in fig. 1, will be better explained by the enlarged sectional views of portions of the piston at figs. 4, and 5. Horizontal sections of opposite sides of the piston are represented at fig. 4, and vertical sections of the same at fig. 5; the same letters, as in the former figures, indicating the same parts. Two metallic spring-rings *k*, *k*, are placed round the periphery of the piston B, within the cap-plates *i*, *i*, against which cap-plates the rings *k*, are respectively pressed upward and downward by a series of helical springs *l*, *l*; and the packing-rings are pressed outward against the interior of the cylinder A, A, by a series of bow-springs *m*, *m*.

The left-hand side of fig. 5, shews one of the upright pins or guides upon which the helical spring *l*, works, for the purpose of forcing the ring-packings *k*, *k*, against the cap-plates *i*, *i*; the ends of the pins being inserted into the packing-rings. The right-hand side of fig. 6, shews the same contrivance as it would be adapted at those parts of the packing where the rings *k*, *k*, are cut open; pieces being applied to block the joints. At the left-hand of fig. 5, one

of the bow-springs *m*, is shewn, by which the packing-rings *k*, are pressed outward; and at the right-hand of the same figure one of the bow-springs *m*, is shewn, pressing outward a piece of metal, which is intended to block the joint of the ring-packing. The bow-springs *m*, by acting laterally, force the packing-rings close against the internal surface of the cylinder, and in the event of the packing wearing away, these springs keep it up at all times to its bearing. For the purpose of rendering the packing of the piston still tighter, steam is admitted into the annular chamber *o*, of the piston, behind and between the packing-rings, by means of tubes (*p*, *p*, see fig. 5,) containing valves, which respectively open from the upper and lower surfaces of the piston to the upper and lower portions of the cylinder. A hollow bracket or projecting piece E, fig. 1, attached to the outer ring or periphery of the piston-frame, carries the above-mentioned tubes and their valves, as more clearly shewn at figs. 4, and 5. The tubes *p*, *p*, as before said, open in opposite directions through the upper and lower plates *i*, *i*, of the piston, in which they are securely fixed by nuts and packing. Two valve-boxes *q*, *q*, are bolted to the hollow bracket-piece E, and are fitted tightly upon the tubes with packing. The valves *r*, *r*, close the inner apertures of the tubes and valve-boxes; their conical edges being pressed against their seats in the valve-boxes by two concentric helical springs *s*, and *t*. When either of the valves *r*, *r*, are opened, steam from the cylinder passes by the pipe or tube *p*, into the central space between the valve-boxes, and thence through the passage *u*, into the annular chamber *o*, of the piston, behind and between the packing-rings *k*, *k*.

The outer helical spring *t*, *t*, is designed to support and keep closed the upper valve *r*; and the inner or smaller helical spring *s*, operates upon both valves *r*, *r*, to keep them closed, when the pressure of the steam from without is withdrawn from it. The effect of this part of the invention will therefore be, that when the expansive force of the steam in the cylinder is acting upon the upper side of the piston, it will enter by the upper tube *p*, and depress the valve *r*, from its seat, and passing down the grooved sides of the valve,

the steam will proceed through the channel *u*, into the annular chamber *o*, between the rim *h*, and the packing-rings *k*, *k*, where its expansive force will aid the springs *l*, and *m*, by exerting an additional pressure between and behind the metallic packing-rings *k*, *k*, so as to force them more tightly against the piston-caps or plates *i*, *i*, and the sides of the cylinder A, A. When the steam in the cylinder is acting against the under side of the piston, it will pass up the lower tube *p*, and, on raising the valve *r*, proceed into the annular chamber *o*, in the way and for the purpose above described. The packing-rings are prevented from sliding round in the piston by a small pin, fixed into the piston-cover, which passes into a projecting piece *j*, on the ring (see fig. 1,); and the bolts by which the covers *i*, *i*, of the piston are held together, are prevented from falling out of their sockets in the rim *h*, on the top cover being removed, by small lateral screws: one of these screws is shewn in figs. 1, and 3.

The patentee next proceeds to explain the third head of his invention, viz., the peculiar construction of the top cover or cap-plate of the cylinder and its appendages, through which the piston-rod slides, and by which it is allowed to vibrate in accordance with the different positions of the revolving crank. To the top of the cylinder A, A, two segmental pieces or wings F, F, are cast, with brackets to support them, as shewn in the section, fig. 2, and in the horizontal view at fig. 1. These segmental pieces are intended to receive the radius-slides or arcs G, G, which carry a perforated ball and socket for the vibrating piston-rod C, to pass through. The cylinder-cover, which is dome-shaped, is shewn in section at H, H, in figs. 2, and 3, having segmental pieces, extending from it at the sides, corresponding with and similar to the brackets F, above; and to the cylinder-cover is attached a hollow segment I, the joint of which is made steam-tight round the edges, leaving a small space *n*, between it and the cylinder-cover. These parts F, H, and I, when bolted together, form the dome-cap or top of the cylinder, which has a parallel opening in it, crossing the cylinder in its diameter, and the two segmental recesses at its sides. The upper and under radius-slides G, G, are fitted to the segment-pieces, as shewn

in fig. 2, and close the aperture in the top of the cylinder: they have a free movement to and fro in the recesses of the wings, and upon the pieces H, and I, which form their guides. The centre of the radius of the sliding-arcs and their guides may be at the centre of the piston when at half-stroke, but that is not important. To the radius-slides G, G, are attached the cup *v*, *v*, and cover *w*, *w*, which enclose the ball K, K; the piston-rod slides through a packed stuffing-box within the ball K, K, to render the sides of the sliding piston-rod steam-tight; and this packing is pressed into its recess by a metal cylindrical piece *x*, *x*, which is kept tight against the packing by screwing down an hexagonal nut L, L: a guard or plate *y*, *y*, having a hexagonal hole to fit the nut, is provided, to keep the nut from turning when the engine is working. To support the dead weight of the lower radius-slide G, G, when the piston is moving upwards, and the upper part of the cylinder is in a state of vacuum, four bolts *z*, *z*, with springs, similar to those employed for safety-valves on locomotive boilers, are placed, as shewn at figs. 2, and 3. These bolts are packed to keep their sockets tight, and prevent the passage of steam from the cylinder into the hollow space *n*, between the radius-slides. To keep the radius-slides constantly close to their bearing surface, the space *n*, should be in communication with the condenser; for which purpose a small tube may be fixed in any convenient place, either to the sides or ends of the segment I. In non-condensing engines the space *n*, should be in communication with the atmosphere. It will now be seen, that as the piston ascends and descends in the cylinder, the piston-rod will be enabled to vibrate, by the lateral motions of its guide, the radius-slides moving to and fro in and upon the cylinder-cap, as described. By this means the piston-rod will be enabled to act directly upon the crank, and the lower end of the rod, by its ball-and-socket connection with the piston, which will also accommodate itself to the inclined positions of the rod; a small rib *c*, at the bottom of the rod, being made to work in a guide-slot, formed in the cap *a*, to prevent the piston turning round.

The cap-plate of the cylinder being dome-shaped, there will be a space between the piston and the upper part of the

cylinder when the piston is at the top of its stroke, as shewn by dotted lines in the sections figs. 2, and 3. In order, however, to prevent the waste of steam, which would thereby ensue on working the engine, the patentee proposes to occupy that space with hard wood, (as at M, M, in figs. 2, and 3,) which may be bolted to the cylinder-cover; but it should be observed, that a space must be left in the middle of the dome-top for the free vibration of the piston.

The fourth head of the invention—which consists in a novel apparatus for regulating the draft of the boiler-flues, and thereby tempering and also giving notice (by a whistle) of the state of steam pressure within the boiler—is described as follows:—Fig. 6, represents in elevation an apparatus to be erected upon the upper part of a steam boiler; fig. 7, is a vertical section of the same, taken at a right angle to fig. 6; and fig. 8, is a plan view of fig. 6.

A, A, is a brass cylinder, bolted or otherwise fixed upon the boiler at *a, a*; the edge of a portion of the boiler being represented at B, B. Four columns C, C, are fixed upon the upper flanged edge of this cylinder, for the purpose of supporting the horizontal plate or frame D, D. An interior cylinder E, of cast iron, made perfectly smooth on its external surface, slides up and down as a plunger, through a circular aperture at *d, d*, in the plate D; the lower end of this cylinder having a broad flange *e, e*, which nearly fits the internal periphery of the brass cylinder A. To the under side of the flange *e, e*, a cup *f, f*, of flexible material is attached, for the purpose of packing or enabling the flange *e, e*, of the cylinder E, to work steam-tight within the cylinder A, A. This flexible cup may be made of several thicknesses of good canvas steeped in boiled linseed oil, with a thin layer of white lead between each; of this canvas there should not be less than four thicknesses. When properly combined, this substance may be pressed in a mould into a cup form, and should be left in the mould for three or four days, in order to allow the white lead to set. The upper end of the cylinder or plunger E, is closed by a plug or socket-piece *g*, securely fastened to the plunger. In the top of the socket *g*, a ball *h*, is imbedded, and confined by a screwed cap or collar *i, i*; and

into the stem of the ball *h*, the end of a rod *k*, of any required length, is inserted and made fast. To the top of the rod *k*, a bar *l*, is attached, having a rack or series of teeth on one side; which teeth take into a quadrant-rack *m*, fixed upon one end of an axle *n*, mounted in the bracket F, above. A slight spring presses against the back of the rack-bar *l*, in order to keep its teeth in connection with the teeth of the quadrant *m*; and a powerful helical spring *q*, *q*, is coiled round the outside of the plunger E, for the purpose of depressing the plunger, in opposition to the force of the steam in the boiler acting upwards against the flange and cup *e*, *f*.

The bracket F, is fixed to the side of the chimney I, of the boiler furnace, and the axle *n*, passes through into the chimney, and carries a disc-plate, which nearly fits the interior of the chimney, to form a damper to the flue by contracting the passage of the chimney and obstructing the draft, as required. Upon the upper end of the inner cylinder E, a toothed wheel *r*, *r*, is loosely attached, in order that the cylinder may, as it ascends or descends, freely slide through it. This wheel *r*, is locked to the cylinder by a key; consequently, when the wheel revolves, the cylinder E, is caused to turn with it. On the plate or frame D, a horizontal axle G, is mounted in plummer blocks, which axle has a worm or endless screw *t*, formed upon it, to gear into the teeth of the wheel *r*. At the end of the axle G, a pulley H, is affixed, by which, through a band from any rotary part of the engine, the axle may be turned.

When the steam-engine is at work, the band above-mentioned, by giving motion to the axle and the wheel *r*, will cause the cylinder to turn with a slow rotary motion; but this will have no effect in raising or depressing the cylinder E, beyond that of relieving the friction of its packing *f*, *f*, against the inner surface of the cylinder A. The pressure of the steam in the boiler B, exerting its force against the under part, that is, the bottom and flange *e*, of the cylinder E, will have a tendency to raise it, as the cylinder E, acts in the character of a piston within the cylinder A; but the powerful helical spring *q*, exerting its force upon the flange *e*, of the cylinder E, in a downward or opposite direction,

will have a tendency to resist the force of the steam and keep the cylinder depressed, as shewn in the figures: the power of the spring *q*, being aided by weights within the cylinder, is made equivalent to the mean pressure of the steam.

Now, in the event of the steam pressure within the boiler increasing beyond the power desired, the force of the steam will overcome that of the weighted cylinder E, and its spring *q*, and the cylinder E, will be raised, not directly, but with a compound motion, like that of a screw; the band and pulley giving to the cylinder E, the slow rotary motion described, whilst the cylinder E, is rising, which will tend to relieve the friction of the packing *f*, *f*, against the internal periphery of the cylinder A. This rising of the cylinder E, produced by an increased pressure of the steam within the boiler, will raise the toothed bar *l*, and cause the toothed quadrant *m*, to turn the axle *n*, as before described, and thereby move the damper into such a position as will obstruct the draft of the chimney; by which means the intensity of the fire in the furnace being reduced, the impelling power of the steam generated will be consequently diminished. When this reduction of the steam pressure within the boiler has taken place, the cylinder E, will be brought down again by the force of the spring *q*, and at the same time the chimney flue will be opened, as before. In the event of the steam within the boiler rising to such a force as might be considered dangerous, its pressure would lift the bottom of the cylinder E, that is, its flange *e*, *e*, to the top of the cylinder A, A. Immediately on this taking place, an aperture *u*, with small holes in the side of the cylinder A, would become opened to the action of the steam, which, rushing through that aperture and through the lateral pipe *v*, connected to it, would communicate with a whistle at the end of the pipe, and give the necessary signal to the attendant.

When the invention last described is adapted to a land-engine (in which the damper of the chimney is usually a rectangular or oblong plate, made to rise and fall perpendicularly), then the toothed quadrant and rack-bar may be dispensed with, and the rod *k*, or bar *l*, may be connected

immediately to the damper, or to a chain and pulley, in the usual way, by which the damper may be made to rise and fall by the motions of the cylinder E, as described; but, in both cases, it is important that the cylinder E, and all the moving parts of the apparatus that are sustained by the steam pressure should be equipoised with the working pressure of the steam in the boiler. For example, if the diameter of the cylinder A, be eight inches, or, in round numbers, fifty square inches in area, and the pressure of the steam in the boiler be four pounds per square inch, then the united weight of those parts of the machine which communicate motion to the damper should be 200 pounds. But as those moveable parts of the machine would be much under this sum, circular weights may be placed in the interior of the cylinder E, to bring the machine to an equilibrium. It may be necessary in marine engines to attach a plate to the side of the bar *l*, as at *w*, fig. 8, next to the funnel, to prevent the rack becoming disengaged from the quadrant by the rocking of the vessel. In order to fix the damper in any desired position when the cylinder E, is not at work (as when the vessel lies at anchor, yet having the steam up), the bar *l*, is drawn back out of gear, and the quadrant *m*, placed in the position desired, and fixed firmly to the bracket by a thumb-screw *x*, as shewn at fig. 6.

The patentee claims, Firstly,—connecting the piston-rod of a steam-engine to the piston by means of a joint formed by a ball-and-socket. Secondly,—keeping the packing of a piston tight by the united force of metallic springs and steam, in the manner shewn and described. Thirdly,—the construction and adaptation of a curved sliding apparatus, with an exhausted chamber between, and attached to the top or cap of the cylinder, for the purpose of allowing the piston-rod to vibrate as it slides up and down, in the manner shewn and described. And Lastly,—the means and apparatus for regulating the generation of steam, and its pressure in the boiler, as exhibited in the drawing and explained above.—[*Inrolled in the Petty Bag Office, January,* 1847.]

Specification drawn by Messrs. Newton and Son

To William Reid, *of Saint Pancras, in the county of Middlesex, engineer, for certain improvements in the manufacture of wire.*—[Sealed 29th October, 1846.]

This invention relates to certain improvements in the manufacture of wire, whereby it is rendered more suitable for the various purposes to which it may be applied; and more particularly for the transmission of electric currents, in electro-telegraphic communication.

Iron wire has usually been made in pieces 192 feet long, weighing about 14 lbs., and when greater lengths were required, the ends of the pieces were welded together; but by this means the wire was rendered thicker at the joints or welds than at other parts, more brittle, and frequently unsound. The first improvement consists in welding together the rods of which the wire is to be formed, end to end, scarfwise, and then passing the united rods through a drawing machine (instead of first drawing the rods into wire, and then welding the ends of the wires together); by which means wire may be produced of any required length and of uniform diameter, and any defects in the welding will be immediately detected by the strain to which the wire is subjected in the drawing machine.

The second part of the invention relates to the cleansing of iron wire previous to its being coated with zinc, tin, or other protecting metal; which process has been usually performed by submitting the wire to the action of nitric or sulphuric acid; but much injury has often been found to result from the acid not acting equally on all parts of the wire. The patentee proposes to effect the cleansing wholly by mechanical friction or action, or to cleanse the wire thereby to such an extent that very dilute acid need only be used. The apparatus to be employed for this purpose is shewn in Plate XVII. *a*, is one of six reels, which are mounted on spindles *b*, fixed to a frame *c*; but the number of reels may be varied, according to the number of wires required to be operated upon at the same time. *d*, is a metal plate fixed to the frame *c*, and formed somewhat similar to the bed of a slide-rest for a lathe. *e*, is a moveable frame carrying three

upright rollers *f, f, f,* and being capable of sliding in the dovetail grooves of the plate *d,* in a direction at right angles to the general direction given to the wires in passing through the machine. *g,* is another metal frame, carrying a second set of rollers *h, h,* placed with their axes horizontally. The coils of wire, as they come from the annealing oven, being slipped loosely over the reels *a,* (one coil being placed on each reel), the ends of the wires are caused to pass between the rollers *f, f, f,* and *h, h, h,* of the two sets above-mentioned; and in order that those surfaces of the wires which have been acted on by the first set of rollers may not be presented to the second set, and that the rollers may not become grooved by the wires always coming in contact with them at the same points, the frame *e,* is made to traverse slowly to and fro in the grooves of the plate *d.* This traversing motion is effected by means of a small excentric on the upper end of the spindle *i,* acting in a recess at the side of the frame *e*; the spindle *i,* being caused to rotate by an endless band from a steam-engine or other first mover passing around the pulley *j.* When the wires are of large diameter, and there is danger of one wire riding on the top of another, a set of guides *k,* are fixed on the frame *e,* and the wires are caused to pass through them.

The action of the machinery above described breaks up and removes any scale of oxide or rust that may be on the surfaces of the wires; but in order that they may be still further cleansed, the wires are next passed between two friction-plates at *l,* cased with wood or leather, and kept constantly supplied with fine sand, emery, or other like cleansing substance, from the funnel *m*; the friction-plates having a reciprocating movement given to them by two rods *n,* connected with a crank-shaft *o,* which is caused to rotate by a band from the steam-engine passing around the pulley *p*: sometimes the wires are caused to pass between hollow floats or files of hardened steel, fixed to the friction-plates *l.* From the friction-plates the wires proceed over the roller *q,* into and through a box or cistern *r,* containing sal-ammoniac, and are then transferred as quickly as possible to the bath of metal, to receive the desired coating.

Instead of friction-plates, the patentee sometimes employs a pair of rollers covered with bristles, whalebone, wire, or other suitable material; or they may be used in combination with the friction-plates: the lower roller rotates in a trough containing one of the above-mentioned cleansing substances, in either a dry or wet state.

The process of welding before the wire-drawing is equally applicable to the manufacture of steel wire; and the cleansing machinery may be used for all kinds of wire, whether made of iron, steel, copper, brass, or other metal or mixture of metals.

The patentee claims, Firstly,—the method of producing iron wire of any required length and of uniform diameter, by first welding the rods of which the wire is formed, end to end, scarfwise, and then passing the united rods through a drawing machine, as above described; also the application of the same to the manufacture of steel wire. Secondly,—the employment of the machinery for cleansing iron wire, preparatory to its being coated with zinc, tin, or other protective metal, as above described; and also the application of the same to all other descriptions of wire.—[*Inrolled in the Inrolment Office, April*, 1847.]

To WILLIAM HENRY FOX TALBOT, *of Lacock Abbey, in the county of Wilts, Esq., for improvements in obtaining and applying motive power.*—[Sealed 7th December, 1846.]

THE patentee commences his specification by referring to a patent obtained by him, October 1st, 1840, for "improvements in producing or obtaining motive power," in the specification of which patent he described a method of obtaining motive power by heating expansible liquids or inflammable gases, by passing through them a current of electricity from a galvanic battery; the communication between the battery and the wire that extended through the vessel containing the expansible liquids or inflammable gases being broken and restored at suitable intervals, by means of a commutator, also described in the specification. The present invention

consists in producing the same effect by the like means, except that, instead of liquids or gases, he now uses solid substances, which explode, when heated, with considerable force. The patentee states that gunpowder cannot be used for this purpose, on account of the difficulty of managing it with safety; but matters possessing less explosive power may be successfully employed: the substance, however, which can be most conveniently used is that known as gun-cotton.*

The apparatus used in carrying out this invention is represented in Plate XVII. *a*, is a vertical cylinder, closed at the bottom and open at the top, containing a solid piston *b*, the rod *c*, of which is connected, in any suitable manner, with a crank on the main shaft of the machinery to be driven. In the sides of the cylinder, near the bottom, two circular apertures are formed, of the required size to admit of a cylindrical rod *d*, passing horizontally through the cylinder. This rod *d*, is provided with holes or cavities, which are packed with gun-cotton or other combustible material; the relative distance between the holes being greater than the semi-diameter of the cylinder *a*. *e*, is a wire of platinum, extending through the cylinder, but suspended in such a manner as to be nearly in contact with the rod *d*: its ends are connected with a galvanic battery.

The piston, when at its lowest position, nearly touches the rod *d*, and, on the electric current being made to pass through the wire *e*, by the action of the commutator, the gun-cotton or other combustible material in that cavity of the rod *d*, which is beneath the centre of the piston, becomes ignited (a small portion of the material being allowed to protrude from each cavity, to ensure its ignition), and the explosive force causes the piston to rise and communicate motion to the crank-shaft. While the piston is descending, the rod *d*, is drawn forward by the action of the machinery, so as to remove the empty cavity from the interior of the cylinder, and bring the next cavity, containing the combustible material, beneath the centre of the piston. The charges of combustible material in all the cavities having been, by a repetition of the

* For the description of the patented mode of preparing this material, see p. 253 of the present Volume.

above-mentioned movements, successively ignited, the rod is drawn out, and another rod enters the cylinder. The different rods are hooked, or otherwise fastened together, so that one draws on the next; and whenever a rod is exhausted and drawn out, its own weight detaches it from the hook that connected it with the next succeeding rod. The patentee states that the aqueous vapour which is often generated by the explosion of the gun-cotton, is apt to diminish the explosibility of a subsequent portion; but the gun-cotton is in a great measure protected from the vapour by being well packed in the cavities of the rod *d*.

The patentee claims, Firstly,—the employment of any solid explosive substance to produce motive power for driving machinery, by means of heat causing explosion, and communicated internally by a galvanic battery. Secondly,—the employing separated portions of such explosive substances, enclosed in cavities of rods or bars.—[*Inrolled in the Inrolment Office, June,* 1847.]

To Samuel Haven Hamilton, *of Paris, in the kingdom of France, Gent., for an invention of improvements in machinery or apparatus for dredging or excavating,—being a communication.*—[Sealed 19th August, 1846.]

These improvements in machinery or apparatus for dredging or excavating consist in a novel construction and arrangement of machinery or apparatus suited to the removal of obstructions, such as soil, gravel, sand, and other materials from the beds of rivers, harbours, docks, and other situations below the surface of water.

The construction and arrangement of this machinery or apparatus is of such a nature as to render it capable of cutting and taking up with great facility, at one operation, very large quantities of soil and other materials from below the surface of the water; and also of conveying away the said soil and other materials when so taken up, without transferring them to other vessels, and of depositing such removed soil and other materials at any appointed spot out at sea, or

elsewhere; or, if required, the soil may be readily discharged from the machine into boats, as circumstances may require; all of which will be made evident by the following explanation:—In Plate XVIII., fig. 1, represents a view of the machinery taken in elevation at the front part; fig. 2, is a horizontal or plan view of the same, as seen from above; fig. 3, is a vertical section of the machinery taken longitudinally through the middle; and fig. 4, represents one of the shovels or scrapers detached from the machine.

A rectangular frame *a, a, a,* say about 20 feet long, 10 feet wide, and 2 feet deep, is divided by internal longitudinal and transverse partitions, into nine open compartments; in each of which compartments one of the shovels or scoops *b, b, b,* nearly fitting the open space in the frame, is suspended upon a transverse shaft or axle *c, c, c,* fixed into the sides of the frame *a,* so that the shovels may act as falling levers. The front part of the frame is guarded by a wooden bulk-head *d,* giving the appearance and protection of a boat's head to the frame. Upon the top edges of the frame six uprights or pillars *e, e, e,* are erected, for the purpose of supporting an upper horizontal rectangular platform or frame *f, f, f,* on which are fixed six standards *g, g, g,* carrying the axles of three transverse rollers *h, h, h.* To these rollers are attached ropes or chains *i, i, i,* by which the falling ends of the shovels are suspended; and the rollers are turned round by winches, pinions, and toothed wheels, for the purpose of raising or lowering, by the ropes *i,* the cutting edges of the shovels *b,* to the angle at which they are required to penetrate into the soil, sand, gravel, or other material below; and in which positions the shovels may be held by pawles, let fall into the teeth of the wheels at the ends of the rollers; or they may rest against stops *j, j, j,* fixed to the frame. At the front part or bulk-head of the frame *a,* there are affixed, if necessary, a series of coulters or scarifiers *k, k, k,* (shewn detached, in two positions, at fig. 5,) for the purpose of breaking up the ground, to facilitate the operations of the shovels or scoops; and chains *l, l,* are attached, by lugs, to the forepart of the frame, by which the whole apparatus is drawn onward by a steam-tug, or any other suitable means. In

bringing the excavating machinery, above described, into effective operation, it is placed between two flat-bottomed boats A, A, which are firmly connected together by stout planks B, B, affixed to strong uprights C, C, erected in the boats near their ends. These planks and uprights, with the boats which they connect, constitute a structure of wood, within which the before-described frame *a, a, a,* with the shovels *b, b, b,* and appendages, forming the excavating machine, is supported, and by which it may be floated to any required spot, ready for operation, and may be there depressed into, or raised out of the water, as circumstances shall require. Two transverse shafts or barrels *m, m,* pass under the planks B, B, through apertures in the uprights C, C; and the ends or pivots of the shafts have their bearings in plummer-blocks upon standards D, D, fixed near the ends of the boats. To these shafts or barrels *m, m,* strong chains *n, n,* are attached, whereby the whole of the excavating machinery, first described, is suspended; and, in order to raise or depress the excavating machinery, independently of the boats or floating structure, the shafts *m,* must be made to revolve by means of winches, pinions, and toothed wheels, as shewn, or by any other suitable apparatus; and when the excavating machinery has been thus placed at the desired altitude, it is held in that position by pawles, taking into ratchet-wheels fixed on the axles of the barrels *m, m.*

In order to ascertain the soundings or depth of water at all times (for the purpose of directing the height to which the excavating apparatus must be lowered or raised to bring it in contact with the ground, when about to be set to work, or to raise it, for affording the means of freely floating the machinery away) the patentee employs an apparatus, consisting of a graduated quadrant-plate, with an index and right-angled plumb-lever, shewn detached, and upon an enlarged scale, at fig. 6; and attached to the side of one of the boats, and in operation, at figs. 2, and 3. The graduated quadrant-plate *q,* may be divided by radial lines and numbered, to represent feet or any other graduations. An index *r,* is fixed upon a short axle, passed through the centre of the quadrant-plate; and upon the same short axle, at right angles to

the index, a long lever *s*, is fixed; the end of which lever carries a plumb or lump of metal *t*. This apparatus being placed, as shewn, at the side of the boat (or it may be in any other convenient situation), the long lever *s*, is depressed by the sinking of the weight or plumb *t*, which, coming in contact with the ground, rests there, or drags over the surface as the boat and apparatus advance; at which time the index *r*, working upon the face of the fixed quadrant, points to such graduation thereon as indicates the depth of the ground below the surface of the water.

The mode of working the improved excavating or dredging machinery is as follows:—The working machine having been raised up between the boats A, A, so as to be perfectly free from the ground, the whole is then floated away, by means of the boats, to the situation where it may be required to commence excavating or dredging. Such of the shovels as are intended to be first put to work are then let down to the suitable angle of inclination for penetrating the ground, by turning the barrels *h*, *h*, whereby the ropes *i*, *i*, *i*, are unwound. The frame, with the shovels and other appendages, are then lowered, until the bottom of the frame is brought in contact with the ground, which is done by turning the barrels *m*, *m*, and thereby unwinding the chains *n*, *n*. By applying a steam-tug-vessel, or other power, to the chains *l*, *l*, the whole apparatus is slowly drawn forward, by which means the coulters or scarifiers *k*, *k*, if they are required and placed as described, will first break the ground; and then, as the machine advances, the sharp cutting edges of the shovels or scoops *b*, *b*, will penetrate to a certain depth, determined by the angles of their inclinations, and scoop up the soil, gravel, sand, or other material. As soon as any of the shovels and their compartments in the frame *a*, *a*, *a*, have become full, those shovels must be drawn up, by turning their barrel *h*, whereby the compartments will be closed. When the whole of the compartments are thus filled with the soil or other material, the frame, with the shovels collectively, may be raised by turning the barrels *m*, *m*; the whole is then to be floated away to the place where the material is to be deposited.

It may here be remarked, that though the shovels are

intended severally to rise and fall freely in the compartments of the frame, yet they must all so nearly fit the internal area of the compartment in which they are respectively mounted, as to prevent the escape of the soil or other material between the sides of the shovels and the partitions of the frame.

When the machine is brought to the place out at sea designed for depositing the material, the compartments of the frame are opened, by lowering the front edge of each shovel; the material will then immediately slide out, and fall to the bottom.

If it should be required to transfer the material to a barge for ballast or other use, then the frame, with its loaded compartments, must be raised, which may be done by turning the barrels *m*, *m*; and when by these means it is lifted to its greatest elevation, the barge may be brought under the machine, between the boats A, A, and the soil, gravel, sand, &c., let fall into the barge by lowering the shovels, as above explained. Under some circumstances it will be best to place the frame above described, with the shovels or scoops and their appendages, in the interior of a boat or raft propelled by steam, and allow the shovels or scoops to act through an aperture in the bottom of such boat or raft; in which case the lateral flat bottoms A, A, and their connecting structure, are dispensed with, the steam-boat or raft constituting the means for progressively advancing the machine when at work, and floating it away when loaded.

The patentee states that he does not intend to confine himself to the number of compartments formed in the frame *a*, *a*, *a*, and consequently the number of shovels or scoops employed; neither does he limit himself to any means of raising or lowering the machine, nor to the shapes of the shovels or scoops, or mode of lifting them, as various other forms and well-known mechanical agents may be suited to the same purposes; but he claims, Firstly,—the adaptation of large shovels or scoops, hanging as levers, and fitting the compartments or boxes formed in a frame; which shovels or scoops, by their inclined positions when let down, are enabled to penetrate into the soil, gravel, sand, or other material, as the apparatus is moved onward; and, when such shovels or scoops are drawn up, closing the bottoms of the said com-

partments, so as to form vessels or receptacles for materials so excavated. And, Secondly,—constructing and suspending such excavating or dredging machinery or apparatus between or within boats or rafts or other buoyant supports, so that the said machinery may be lowered to its work, or raised out of the water and floated from place to place.—[*Inrolled in the Petty Bag Office, February,* 1847.]

Specification drawn by Messrs. Newton and Son.

To WILLIAM EDWARD NEWTON, *of the Office for Patents,* 66, *Chancery-lane, in the county of Middlesex, civil engineer, for improvements in preserving fruit and vegetables,—being a communication.*—[Sealed 17th September, 1846.]

THIS invention, which was communicated to the patentee from abroad, is described by the inventor as follows:—

It is a fact well known that fruit and other vegetable substances may be preserved in a perfect state, for an indefinite length of time, if kept at a temperature nearly approaching the freezing point of water, without being actually allowed to freeze.

The apparatus hereafter described is intended to produce this condition, and thereby act as a fruit and vegetable preserver. The articles to be preserved are placed in a compartment in which they are surrounded on all sides by ice, or by water at or near the freezing temperature, but so disposed as not to come into contact with or induce the freezing of the articles placed therein. The apparatus is constructed to admit of a renewed supply of ice being introduced at the top or the sides, whenever it is required.

When complete, the apparatus is usually divided into two principal compartments, one of which constitutes an ice-house, from which the ice necessary for the second or fruit and vegetable preserver is to be supplied. This combination of two such compartments is not, however, absolutely necessary, as the preserving compartment may be constructed and used separately, where there is already an ice-house, or where, from any cause, it may be desirable to separate the two.

In Plate XIX., fig. 1, is a top view of the apparatus com-

plete, when constructed with the two compartments above-named; the outer covering or roof being removed from the ice-house compartment, and a second or lower and inner covering from the preserving compartment. Fig. 2, is a vertical section, taken longitudinally through the middle of the apparatus. Figs. 3, represent the roof or upper covering of one of the compartments; the roof of both compartments being similarly constructed. Fig. 4, is an outside perspective view of the preserving compartment, separated from the other parts of the structure. A, A, represents the ground, or rather a wall of stone or brick, built for the purpose of supporting the sides of the excavation in the ground, within which the compartments are situated. B, is the ice-house, and C, the preserving compartment. D, D, is a space left between the sides of the compartments and the wall or ground, so as to prevent the communication or transmission of heat. Each of the compartments is formed of a double box of plank *a*, *a*, and *b*, *b*, having a space *c*, *c*, between them, which is to be filled with charcoal, tan-bark, or other bad conductor of heat. Between the two compartments, when conjoined, there is also a similar filling as at *c**. The flooring *d*, *d*, of the compartments is supported above the bottom of the excavation, to protect them from the heat of the ground, and also to allow of a free passage to the water produced by the thawing of the ice.

E, E^1, figs. 1, 2, and 4, represent the second or lower covering to each of the compartments; which covering, like the roof or upper covering, to be presently described, is slightly pyramidal or sloping from the centre to each of the sides. F, F^1, figs. 1, and 4, are doors, through which an entrance may be had to either of the compartments. Ice may be placed upon the covering E, of the ice-house, and as this ice melts, the water from it will trickle down an inner wall of the ice compartment, and will absorb any heat which might otherwise find its way through the charcoal or imperfect conductor, and flow under the preserving compartment, and tend to keep it at the proper temperature.

The preserving compartment C, fig. 4, shewn also in section at fig. 2, consists of a box, distinct from the compartment. This box, receptacle, or room, is made of plank-

ing, having a covering E^1, as described, and is surrounded on all sides with several troughs or tubes *e, e*, figs. 2, and 4, which, when desired, may be filled with water: in the section fig. 2, they are represented as tubes. *f, f*, fig. 4, are vertical tubes through which the water may be poured, and caused to pass into those marked *e, e*. This is only to be done when, from excessive cold, there may be danger that the contents of the vegetable compartment might freeze,—an event which, by this provision, may be effectually prevented. G, G, are planks on the outside of the troughs *e, e*, serving to prevent the ice which may be interposed between the compartment C, and the excavation containing it from coming into direct contact with the inner planking. *g, g*, is the space between the preserving compartment and the excavation.

Over the excavation for the preserving compartment, and also over the ice-house, when the two are combined, a roof or covering H, H, figs. 2, and 3, is placed. This covering consists of shallow boxes, fitted closely together, and containing charcoal or other bad conductor of heat. Between the covering H, and E, E^1, is a space for stowing a stratum of ice; and when this requires to be renewed, either of the shallow boxes may be removed without disturbing the others. When it is desired to enter the ice-house, or the preserving compartment, a door I, fig. 3, in the upper covering, corresponding with the doors F, F^1, in the lower covering, may be removed. The preserving compartment does not reach to the bottom of the excavation in which it is placed, but sufficient space is left between the lower part of the preserving compartment and the bottom of the excavation to allow room for the water to pass off; provision being made to allow such water to be either absorbed by the ground or drawn off into a reservoir. The covering E^1, of the preserving compartment conducts the water, produced by the melting of the ice, on to the inner side of the planking *b, b*, down which it trickles; and for the more hardy fruits and vegetables, which have little tendency to ferment, this will suffice for their protection; but for the preservation of the more delicate kinds, which soon spoil, ice must be passed into the space *g, g*: this space should, however, be a few inches only in width, to admit but a small quantity of ice.

The patentee claims constructing the preserving apparatus so that the substances contained in the preserving compartment may be subjected to the influence of the ice deposited on the covering E^1, in conjunction with that of the ice cold water produced by its melting, or to the additional influence of a thin stratum of ice surrounding the sides of the said compartment, or to the moderated temperature produced by the supplying of water to the tubes or troughs *e, e*; the respective parts being combined, arranged, and operating substantially as above set forth.—[*Inrolled in the Petty Bag Office, March*, 1847.]

To Charles Wright, *of No.* 23, *Southampton-row, Russell-square, in the county of Middlesex, boot-maker, for certain improvements in the manufacture of boots and shoes.*—[Sealed 22nd May, 1846.]

This invention consists, firstly, in employing metal "plugs" in the manufacture of boots, shoes, clogs, and galoches, for fastening the upper leathers to the soles, the heels to the soles, and the inner and outer soles together, instead of sewing or employing the ordinary pins or sprigs; secondly, in waterproofing leather or other materials for making boots and shoes, by the application of certain compositions; and lastly, in ventilating boots and shoes by the introduction of an air-passage through the heel, similar to the ordinary spur-box.

In Plate XVII., figs. 1, 2, and 3, exhibit three kinds of plugs employed by the patentee for the purposes above-mentioned; they are made of zinc or copper, or of copper tinned or galvanized, or of any other malleable metal tinned or galvanized, and when driven in, their ends coming in contact with an iron or metal-bound last, are turned up or clenched, and thus hold together the whole of the parts through which they pass. If preferred, the heels may be sewn on as usual; or the seats may be sewn round, and the sole-piece sewn down to the seat; after which, the lifts and top-pieces are put on and fastened with the plugs.

The composition for waterproofing leather or other mate-

rials to be made into boots and shoes is formed by dissolving one pound of India-rubber in half a gallon of spirits of coal-tar, and then adding one gallon of boiled linseed oil, one quart of gold size, two pounds of litharge ground in oil, a quarter of a pound of ground ammonia, and one pound of vegetable or other black: these ingredients are simmered over a slow fire, and stirred until well mixed. Or the composition may be made by dissolving one pound of India-rubber in a gallon, half a gallon, or a quart of boiled linseed oil, over a slow fire, and then adding one pound of litharge ground in oil, and half a pound of vegetable or other black. Two or three coats of the composition are put on the leather or other material, and rubbed in with the hand or brush; when dry, the surface is rubbed down quite smooth with pumice-stone, glass-paper, or sand-paper; after which the material is ready to be manufactured into boots and shoes.

Fig. 4, is a plan view of the upper side; fig. 5, a longitudinal section, and fig. 6, a plan view of the under side of an instrument for ventilating boots and shoes according to the last part of this invention. It is made like a spur-box, with a tongue of elastic metal *a*, pierced with holes *b*, *b*, forming the upper side of the box;—*c*, is the spring catch to hold the spur. The instrument is to be worked into and through the heel, similar to an ordinary spur-box, and along the sole, between the outer and inner soles; when this is done, holes, corresponding with the holes *b*, in the metal tongue, are to be pierced through the inner sole, so as to permit the air, which enters at the outer end of the spur-box, to ventilate the boot or shoe and keep the foot cool.

Fig. 7, is a longitudinal section of a similar ventilating instrument, having the spring-catch *c*, for holding the spur, at the lower part instead of the upper part of the spur-box.

The patentee claims, Firstly,—the plugs above described, and the use thereof in the manufacture of boots and shoes. Secondly,—the waterproofing materials or compounds above described. Thirdly,—the ventilating apparatus and mode of applying the same in the manufacture of boots and shoes, as above described.—[*Inrolled in the Inrolment Office, July,* 1846.]

To John Platt, *of Oldham, in the county of Lancaster, machinist, for certain improvements in machinery or apparatus to be employed in the preparation and spinning of cotton and other fibrous substances.*—[Sealed 25th February, 1846.]

This invention of improvements in machinery or apparatus to be employed in the preparation and spinning of cotton and other fibrous substances relates, firstly, to those machines used for preparing cotton, &c., called "scutchers" or "lap machines," and consists, principally, in a certain novel arrangement and construction of such machinery or apparatus, wherein the wire cylinder or "cage," and the grid usually placed between the cage and the "beater" are entirely dispensed with,—endless wire gauze flexible cloths being substituted in place thereof; whereby the cotton, &c., is perfectly cleansed, and also a great saving in the cost of such machines is effected. Secondly, the invention applies to the drawing-frame, and consists in certain improved mechanism, designed for the purpose of shifting the driving-strap from the fast on to the loose pulley, and thus stopping the motion of the machine whenever any of the sliver breaks, or is absent from the drawing-rollers; whereby the occurrence of what is termed "single" in the slivers is prevented. Thirdly, the invention consists in a simplification of the change motion employed for reversing the motion of the copping-rail in slubbing and roving frames, whereby a part of the mechanism usually employed is dispensed with; it also refers to the shifting of the cone strap, for regulating the diameter of the bobbin. Fourthly, the invention applies to those machines used for spinning cotton, &c., called "throstles," and consists in so arranging the lifting mechanism employed for working the copping-rails that both rails (that is, the rail on each side of the machine) shall be lifted at once and upon the same level, instead of being lifted alternately, as in the ordinary spinning-frame; which improvement enables the spinning or winding-on of the yarn to the bobbin to be commenced either at the top or any particular portion of the bobbin: this improvement is applicable either to the moveable copping-rails, or the fixed rails and a moveable lifter.

In Plate XVIII., fig. 1, represents a longitudinal section of a scutcher or lap-machine, shewing the application of the first part of the invention. *a, a,* is the framework of the machine; and *b, b,* the endless travelling feed-cloth, composed as usual of ribs or laths of wood, fastened transversely upon leather straps or belts. The cotton or other fibrous substance under operation is evenly spread by hand upon the feed-cloth *b, b,* from whence it proceeds between the two pairs of fluted rollers *c, c,* and *d, d,* to the beater or scutcher *e, e,* which loosens the fibres of the cotton or other fibrous material; causing the dirt and other extraneous matter to fall through the bars of the grid *f, f.* The action of the beater *e, e,* throws the cotton, &c., over the plate *g,* on to the endless travelling-cloth *h,* composed of wire-gauze, or of wire and linen, or other fibrous material interwoven therewith, by which it is carried onwards and passed under an endless travelling-cloth *i,* also composed of wire-gauze. Two flues *k,* and *l,* open into the interior of each of these endless wire-cloths respectively, and join ultimately in a flue, which communicates with the fan or other exhausting power employed. A current of air being caused to pass through each of these travelling wire-cloths *h,* and *i,* the lighter dust, &c., will be drawn through the flues,—the heavier dust falling into the trough *p,* below; while the cotton, &c., is carried onwards in the form of a lap or sheet, and passed between the calendering-rollers *m, m,* and lapped upon the roller *n,* by friction of contact with the two fluted rollers *o, o.*

Fig. 2, represents an end view of a "drawing-frame," with the second part of the improvements shewn as applied thereto; fig. 3, is a front view of the driving-end; and fig. 4, a transverse section of the same. *a, a,* is the framing of the machine; *b, b,* are the guides; *c, c, c, c,* are the drawing-rollers; and *d, d,* the calendering-rollers. *e, e,* is a shaft, extending across the machine, and to it a constant oscillating motion is imparted in the following manner. One half of a clutch-box *f,* is made fast upon the shaft *e,* while the other half f^1, is loose upon the shaft, but is fixed to the boss of the lever *g,* which rests upon a small excentric *h.* This excentric is caused to revolve by gearing or otherwise, whereby an

oscillating motion is imparted to the lever *g*, and by means of the clutch-box to the shaft *e*: or a continuous rotary motion may be imparted to the said shaft *e*. The slivers of cotton, &c., after proceeding between the guides *b*, *b*, pass over the fingers or triggers *i*, *i*, *i*, *i*, and, by their weight, and tension, hold them in the position shewn in the drawing; but should one of the slivers break between the guides and the drawing-rollers *c*, *c*, the trigger *i*, over which it passes will fall down, and come into contact with one of the oscillating levers *k*, fixed upon the shaft *e*, *e*; thereby stopping the motion of that shaft, and consequently of that half *f*, of the clutch-box which is attached to it. But as the motion of the other half f^1, of the clutch-box still continues, the inclined surfaces of the teeth, by acting against each other, will cause the clutch-box to expand, and, by acting against the tail-piece of the slotted lever *l*, raise that lever; thus releasing the pin *m*, upon the strap-lever *n*, and allowing the spring *o*, to exert its force, and throw the driving-strap from the fast pulley on to the loose pulley, and thus stop the machine. Again, should one of the slivers break between the drawing-rollers and the trumpet-guide *p*, and lap around the top roller, the increased diameter of the roller (in consequence of the lapping of the broken sliver), will raise the lever *q*, and bring the end of the lever *r*, into contact with the oscillating finger *s*, upon the shaft *e*, and stop the machine. And further, the trumpet-guide *p*, is itself so balanced, that should the preceding arrangement by any means fail to act, the deficiency of the web or sliver passing through it will allow the lever *t*, to overbalance it, and come into contact with the finger *u*, upon the shaft *e*, and immediately stop the evolutions of the machine.

Fig. 5, shews the third part of the improvements, as adapted to the well-known reversing-motion employed in roving and slubbing-frames. The improvement consists in using one double-acting weight only instead of two, as usually employed for the purpose of reversing. The weight *a*, is supported by the chain *b*, which passes between the friction-rollers *c*, *c*, upon the reversing-lever *d*, and thus acts alternately upon each of them.

Fig. 6, is an end view detached; and fig. 7, is a general side elevation (on a smaller scale) of part of a roving or

slubbing-frame, exhibiting a modification of this part of the invention, wherein one weight only is required for the two purposes of working the reversing-motion, and also for regulating the cone-strap. *a*, is the weight, which, by means of the cord or chain *b*, passing between the friction-rollers *c*, *c*, upon the reversing-lever *d*, acts alternately upon each of them, and thus reverses the motion of the copping-rail. The same weight *a*, also, by means of the cord *e*, *e*, turning the shaft *f*, causes the pinion *g*, at the top, working into the rack *h*, connected with the strap-carriage *i*, *i*, to traverse the strap *k*, along the cone *l*, as required. As the same motion may also, under some circumstances, be performed by a spring instead of the weight *a*, an arrangement is shewn at fig. 8, wherein the spring *m*, may be employed for reversing.

Fig. 9, represents an end view of a throstle-frame, shewing an arrangement wherein both the copping-rails may be lifted and lowered at the same time, and upon the same level. *a*, *a*, is the framing of the throstle, and *b*, *b*, the spindles driven by the horizontal drum *c*. *d*, *d*, are the bobbins supported upon the copping-rails *e*, *e*, which are both to be lifted and lowered at once (instead of alternately as usual), by means of any suitable arrangement of gearing, and worked by the worm and wheel *f*, and *g*: they are counterpoised by the balance-weights *h*, and *i*, suspended over the pulleys *k*, and *l*, instead of each balancing the other, as in the ordinary arrangement. When it is required, after doffing, to raise the copping-rails by winding them up by hand, the worm *f*, must be disengaged from the wheel *g*; this may be readily accomplished by pulling the worm out of gear by means of the lever *m*, or through any other convenient motion. —[*Inrolled in the Petty Bag Office, August*, 1846.]

Specification drawn by Messrs. Newton and Son.

To JOHN DEARMAN DUNNICLIFF, *of Nottingham, lace manufacturer, and* WILLIAM BULL DEXTER, *of the same place, lace manufacturer, for improvements in the manufacture of warp fabrics.*—[Sealed 24th December, 1845.]

THE first part of this invention consists in so constructing and arranging warp frames that warp fabrics may be made

by employing three or more warp threads to each needle. Two of the threads are used for forming the ground of the fabric, and the additional threads are employed for making ornamental patterns, which may be produced in the form of cut pile (constituting velvet), or looped pile (constituting terry velvet), or in the form of satin surfaces; the additional threads being worked independently of each other, and of the threads which make the ground of the fabric, and being governed in their working by Jacquard or other pattern surfaces.

The ordinary construction of the warp-frame being well known, it will not be necessary to describe the same in detail. The improvements relate principally to that part of the warp-frame termed the "machine," and are as follows:—The guides for the two sets of threads that produce the ground of the fabric are what are termed spring-guides; each consisting of a straight strip of metal, with a hole at the front end, affixed, by means of a projection at the centre of its length, to its guide-bar. The front ends of these guides are caused to change their position with respect to the needles with which they are working, by means of vertical droppers or racking-bolts, contained in combs beneath the guides. The upper ends of the droppers are caused to rise between the outer ends of the guides by the employment of a Jacquard apparatus, and the droppers are racked at suitable intervals, when those which have been raised will act on the outer ends of the guides, and cause those ends to be shogged, independently of their guide-bars, and consequently their other ends, which carry the threads, will be deflected. The guide-bars have one uniform succession of rackings, and the whole of the threads carried by the spring-guides would act alike in lapping their threads on to the needles if they were not interfered with by the introduction of the droppers.

Beneath these guides there is a series of lever-guides, each carrying two threads (which is the number of additional threads preferred by the patentees), so that there will be altogether four threads to each needle. The lever-guides move on an axis, between the plates of a comb; the front end of each guide has a small hole to receive the thread, and

the tail is formed with a larger opening, into which a metal disc is inserted, and as the tail works between the plates of the comb, the disc cannot come out of its place; to each metal disc a wire is fixed, and descends to such a position that its end may be acted on by the cards of a Jacquard cylinder. The threads carried by the lever-guides will be lapped on to the needles according to the arrangement of the pattern for the time being, and according to the manner in which these additional threads are caused to work, will ornamental additions be produced on the warp fabrics, of the character of cut or looped pile, or satin weaving. The additional threads are supplied from separate bobbins, instead of being all wound on the same roller; by which means each thread may be used up in the fabric, independently of the rest.

When cut pile is to be made, a series of knives (one to each space between the needles) is applied to the warp-frame, above the needles; these knives slide in combs, and are worked by a Jacquard-barrel or other pattern surface. The knives selected by the pattern surface descend between the needles after the threads from the spring-guides have been lapped on the needles, to form the ground of the fabric; the lever-guides then lap their threads on to the needles in front of the knives; and when the knives ascend, they sever the threads, and thus produce the cut pile. When the pile is to consist of uncut loops, blunt blades are substituted for the knives; but when satin surfaces are to be made, neither the knives nor the blunt blades are used.

The second part of this invention consists in the use of independent pressers to the separate needles of a warp-frame, in place of the ordinary presser-bar; such separate pressers being acted on by Jacquard or other suitable pattern surfaces.

The pressers, when put into the required position by the pattern surface and fixed, work in the same manner as the common presser-bar, except that some press their needles and others do not press them, according as they have been operated on by the pattern surface. When the selected pressers press on their needles, the work on such needles is knocked off, but the work on those needles which have not

been pressed is not knocked off, but remains thereon until their pressers act on them: by this means great variety in the pattern may be produced.

The patentees claim, Firstly,—the manufacture of warp fabrics in warp-frames, by employing three or more threads to each needle; also the combined using of spring-guides and lever-guides in warp machinery; and likewise the supplying lever-guides of warp-frames with threads from bobbins (in place of having several threads wound on the same beam), whereby each thread may be used up in a fabric independent of all other threads. Secondly,—the manufacture of warp fabrics in warp-frames, by applying thereto independent pressers, one to each needle.—[*Inrolled in the Inrolment Office, June,* 1846.]

To Baron Charles Wetterstedt, *of Rhode's-Well-road, Limehouse, in the county of Middlesex, for improvements in the manufacture of sheet-metal for sheathing and other purposes, in preventing the corrosion of metal, and in preserving wood and other materials.* [Sealed 3rd November, 1846.]

The first part of this invention consists in manufacturing lead, combined with a small quantity of antimony, into sheets for various purposes. The lead is melted, and regulus of antimony is added thereto in the proportion of from one to two parts, by weight, to one hundred parts of lead; the mixture, after being well stirred and skimmed, is run off and rolled out into sheets. The patentee says he is aware that lead and antimony have been before combined together; he does not, therefore, claim the same generally; this part of his invention consisting merely in combining antimony with lead in such proportions as will allow of the compound being rolled into sheets.

The second part of this invention consists in manufacturing copper, combined with a small quantity of antimony, into sheets for various purposes; and in combining certain other metals together, and rolling them into sheets. The patentee adds to every two hundred pounds of copper in the refining

furnace, when it is ready to be run out, about one pound of regulus of antimony, and two or three pounds of calcined soda, heated to nearly the melting point; the metal is well stirred and skimmed, and then it is run into moulds, and afterwards rolled. In carrying out the second improvement, the patentee employs two furnaces, placed side by side, one containing refined copper (prepared as described in the preceding improvement, or refined in the usual way), and the other Muntz's patent yellow metal; an iron mould, coated with clay and sand, is made red hot, and into it is poured one part of copper to four or five parts of yellow metal; but previous to the yellow metal being poured in, a small quantity of melted tallow is sprinkled over it, with a brush, for the purpose of cleaning it; the yellow metal is then poured in, and the whole mass is in a fit state for rolling into sheets. If preferred, brass may be substituted for the yellow metal. The same process may be employed for producing a combination of lead and tin; the two materials being used in the proportion of four or five parts of lead to one of tin or tin and lead combined.

The third part of this invention consists in certain methods of preventing the corrosion of metals and preserving wood and other materials.

A paint, for effecting these objects, is prepared by melting two or three parts of copper with one part of regulus of antimony, and running the mixture into water; after which it is dried by a gentle heat; then two parts of oxide of copper are added, and the whole is ground; the mixture being moistened during the operation of grinding with as much naphtha as will bring it to a thick pasty state. The metallic composition thus made is reduced to the required consistence, in order that it may be used as paint, by the addition of a solution composed of tar and naphtha in equal parts. When preparing paints in which zinc or lead is to be employed, the patentee uses antimony in the proportion of one and a half parts to one part of zinc or lead; and when tin is employed, the relative proportions should be two parts of antimony to one of tin. These materials are melted together, run into water, and ground, as above described (the oxide of copper

being omitted); and they are brought to the required consistence by the addition of oil and turpentine and suitable drying ingredients, or of the solution formed of tar and naphtha, before mentioned.

Another composition or paint, which may be applied to the metal, wood, or other material previous to its being coated with the above paints, or which may be used alone as a preservative, is made by melting together thirty pounds of tar, thirty pounds of pitch, twenty pounds of dried soot, and four pounds of tallow or sperm oil; a sufficient quantity of naphtha being added to bring the mixture to a suitable consistence.

Another plan for preventing corrosion is by immersing sheets of copper and zinc and copper and zinc nails in a solution composed of muriatic acid of commerce sixty pounds, oxide of copper or old copper ten pounds, and regulus of antimony three pounds; the sheets and nails being allowed to remain for two or three days in the solution, which is to be kept at a temperature of not less than 70° Fahr.

The patentee claims, Firstly,—the mode of manufacturing sheet-metal by combining lead and antimony. Secondly,—the mode of manufacturing sheet-metal by combining copper and antimony; also the mode of combining copper and yellow metal, to be afterwards rolled into sheets of sheathing, and for other purposes; also the mode of manufacturing sheet-metal by using lead and tin; also the treating of sheet-metal and nails as above described. Thirdly,—the modes of preparing or combining materials to be employed as paint for the prevention of corrosion of metals, and also for the preservation of wood and other materials.—[*Inrolled in the Inrolment Office, May,* 1847.]

To Louis Hypolite Piaget *and* Philip Henry Du Bois, *of Wynyatt-street, Clerkenwell, in the county of Middlesex, for improvements in producing ornamental metal surfaces.*—[Sealed 12th November, 1846.]

This invention consists in certain methods of obtaining ornamental surfaces of copper, silver, and gold.

The method of producing a copper plate with an ornamental surface by electro-deposition, is as follows :—Fourteen pounds of blue vitriol (sulphate of copper) are dissolved in seven quarts of warm water, and, when cold, the solution is poured into an earthenware vessel, indicated by the letter *a*, at fig. 1, in Plate XVII. In the upper part of the vessel *a*, is fixed an earthenware plate *b*, having several holes in it to receive the tubes *c*, and another hole *d*, at the centre, through which the model or models to receive the deposit of metal are introduced into the bath; and upon the plate *b*, some pieces of vitriol are placed. The tubes *c*, are filled with a mixture of five pints of water, half a pound of common salt, a quarter of a pint of fresh human urine, and six drachms of sulphuric acid, and are to be kept filled, by the addition of the requisite quantity of the mixture at the expiration of every six hours, until the third day; the tubes are then emptied and re-filled, and are kept full by the repeated addition of the mixture, as above-mentioned, till a deposit of the desired thickness is obtained; care being taken to prevent any drops of the mixture from falling into the bath. The model, which should be made of gold, silver, or copper, is engraved, engine-turned, or otherwise ornamented, and a piece of copper wire is soldered to the back; the model is cleaned with plumbago and a brush, and its back is fixed in wood, leaving only the required surface exposed. The wire soldered to the back of the model is connected by a screw to a piece of zinc, weighing about five ounces; this piece of zinc the operator places in one of the tubes *c*, and introduces the model into the bath through the opening *d*. When a metal plate of the desired thickness has been formed upon the model, it is removed therefrom, and its surface will exhibit a polished or dead appearance, according to the manner in which the model has been prepared.

The bath for producing ornamental surfaces of silver, either by the aid of an electric battery or by simple immersion, is prepared as follows :—First, seven hundred drachms of recently-prepared sulphate of soda are dissolved in four pints of warm filtered water; secondly, twenty-five drachms of carbonate of soda are dissolved in one pint of warm filtered water (when the bath is to be employed with electric cur-

rents; but when the bath is to be used alone, the quantity of carbonate of soda is increased to seventy-five drachms); and thirdly, thirty-one drachms of moist carbonate of silver are dissolved in one pint of warm filtered water. When these solutions have become cold, the first and second are mixed together,—the third is then added, and the whole is well stirred with a glass rod: this solution is to be used cold. When electric currents are to be employed with the solution, the battery is constructed in the manner represented at figs. 2, 3, 4, and 5; fig. 2, shewing the battery complete, and figs. 3, 4, 5, exhibiting the different parts separately. It consists of a glass jar *a*, a tube *b*, of charcoal, with a copper band *c*, secured to its upper end, a porous vessel *d*, and a tube *e*, of amalgamated zinc, having a copper strap *f*, fastened to it. For small articles of silver, such as watch-cases, three such batteries connected together will be sufficient; but for larger articles more batteries will be required. A mixture of nitric acid and water in equal quantities being put into the jar *a*, the tube *b*, is placed in the jar, and the porous vessel *d*, is inserted into the tube *b*, (the liquid in the jar *a*, should now nearly fill it); into the vessel *d*, a mixture of quarter of an ounce of sulphuric acid, one ounce of common salt, and two pints of water is poured, and the tube *e*, is then introduced. The bands *c*, of the three or more batteries used are to be connected; then metal connections are to be made between the models, which are introduced into the bath to receive precipitations thereon; the straps *f*, are to be connected to each other, and the one from the last battery is to have a piece of platinum wire soldered to its end; which wire is to dip an inch and a half into the liquor of the bath.

The bath for producing ornamental surfaces of gold by the aid of electric currents is made in the following manner:—First, three hundred and seventy-five drachms of phosphate of soda are dissolved in four pints and a half of warm filtered water; secondly, fifty drachms of recently prepared sulphate of soda are dissolved in half a pint of warm filtered water; and thirdly, seven drachms of dry chloride of gold are dissolved in half a pint of warm filtered water. The first and third solutions are first mixed together, and then the

second is added: the solution thus prepared is to be used with the battery shewn at fig. 2, when in a warm state, but not boiling.

The bath for producing surfaces of gold by immersion is prepared as follows:—Seven hundred drachms of pyrophosphate of potash are dissolved in five pints of warm filtered water, and the solution filtered if it be not clear; when the solution is cold, seven drachms of dry chloride of gold are dissolved in half a pint of water, and poured gently into it, and the mixture is well stirred: this solution is to be used warm.

The patentees describe the following method of preparing an electrotype model plate for gilding or silvering after it has left the hands of the workmen:—It is first put into essence of turpentine for a quarter of an hour; then well washed and brushed; next immersed in a mixture of half an ounce of nitric acid and two pints of water, to remove the oxide; then put into cold water and again brushed with rouge to give it brilliancy; after which it is immersed in fresh human urine for eight or ten minutes; and it is again put into cold water:—the plate is now ready for the gilding or silvering processes above described.

The patentees claim, Firstly,—the means, above described, of making ornamental surfaces of copper. Secondly,—the producing ornamental surfaces of silver by employing the bath above described; and also the employment of the bath above described for silvering by immersion. Thirdly,—the producing ornamental surfaces of gold by employing the bath above described; and also the employment of the bath above described for gilding by immersion.—[*Inrolled in the Inrolment Office, May,* 1847.]

To Thomas Waterhouse, *of Edgeley, in the borough of Stockport, in the county of Chester, cotton manufacturer, for certain mechanical improvements applicable to railway engines and tenders, and to railway carriages of various kinds.*—[Sealed 10th March, 1847.]

The first part of this invention is intended to facilitate the

passage of railway engines, tenders, and carriages around curves, by allowing each wheel to move independently of its fellow. This is effected by forming one of each pair of wheels with a long nave or boss (the patentee recommends that its length should be equal to one-half the diameter of the wheel to which it is applied), which is bored to fit the axle, and works against a shoulder on the same; it being kept in contact with the shoulder by a moveable collar or washer, secured to the axle, outside the nave of the wheel, by a key: the other wheel is fixed to the opposite end of the axle. Another mode of carrying out this part of the invention consists in dividing the axle at the centre into two parts, and fixing additional bearings to the lower framing of the carriage, for the purpose of supporting the inner ends of the two parts of the axle; by which means the wheels are permitted to rotate perfectly independent of each other.

The second part of this invention consists in the application to railway engines, carriages, and tenders, of an apparatus for sounding signals by means of compressed air. The apparatus consists of a force-pump for compressing air into a receiver or receivers beneath the carriage, from which it can be admitted, by the guard or attendant, into a railway whistle or other suitable instrument for sounding signals. The pump is worked by a lever or levers, acted upon by hand, or by the motion of an excentric fixed on one of the axles of the carriage, or by any suitable mechanical contrivance for communicating motion from the axle; and the apparatus is so constructed, that when the air is compressed to the required degree, the pump will cease working until the pressure is reduced.

The patentee claims, Firstly,—giving a revolving action to one wheel on each axle of a railway engine or tender, or of railway carriages of various kinds, wholly independent of the action of the opposite wheel on the same axle, in one case without interfering with the rotation of the axle itself, and in the other case by dividing the axle into two parts; so that, in either case, the first-mentioned wheel may travel at any speed, faster or slower than the opposite wheel, suited to the curved line of rails which it may have to pass over or

along, or to other circumstances rendering such variation of speed between two opposite wheels desirable. Secondly,—an improved apparatus for sounding a signal whistle, to be applied to railway engines and tenders, and to railway carriages of various kinds, in order to cause the whistle to be acted upon by condensed air, obtained by the motion of the carriages in travelling along the line, or otherwise, instead of by steam; and which whistle being, therefore, wholly independent of the steam of the engine for its action, may be applied to any convenient part of any engine, or tender, or railway carriage, or any number of carriages, and thus furnish a signal by which the guards may communicate with each other, or with the engine-driver, from any carriage of a train, however distant it may be from any other carriage or from the engine.—[*Inrolled in the Inrolment Office, May,* 1847.]

To Samuel Heseltine, jun., *of Bromley, in the county of Middlesex, engineer, for an invention of certain improvements in the construction of lamps to burn oil,—being partly a communication.*—[Sealed 8th October, 1846.]

This invention relates to the construction of lamp known as the fountain lamp, in which the oil to support combustion is forced from a reservoir below up to the wick in the burner.

In Plate XIX., fig. 1, represents a transverse vertical section of a table lamp, constructed according to the present improvements. *a, a,* is the oil reservoir, which is furnished with a piston *b, b,* made of leather or some other suitable material: this piston is cup-shaped, the edges being turned downwards, as shown in the sectional figure, and made to fit the sides of the chamber. A weight *c, c,* is attached to the under side of the piston, and is furnished with a perforated metal disc or plate *d,* which is made to fit the sides of the chamber, and act as a guide to keep the piston in a proper position. Attached to the upper side of the piston *b,* is a straight tube *e, e,* which supports at its upper end the burner, glass-holder, and all the upper parts of the lamp; this tube *e, e,* passes up through a stuffing-box *a*, a*,* which

acts as a guide for its upward and downward movements. The burner does not differ materially in construction from those generally used in fountain lamps. The oil for supporting combustion is supplied from the reservoir *a*, to the burner by the pipe *f*, *f*, which, in order to regulate the supply with nicety, is furnished with a cock *g*, which may be easily adjusted by means of a screw-driver. The lower end of the pipe *f*, passes through the piston *b*, and its weight *c*, and is open to the reservoir below, while the upper end is in communication with the lower part of the concentric tube or annular space of the burner. The wick-holder, shewn detached at fig. 2, is of the ordinary construction for lamps of this description, and consists of a short tube *h*, furnished with spring catches *i*, *i*, which, when the holder is placed in the concentric tube or annular space of the burner, are made to clasp the wick, and hold it firmly. The wick is raised or lowered and adjusted in the tube by means of a pinion *j*, in gear with the rack *k*, of the tube *h*, as is well understood. When the lamp requires to be filled with oil, the reservoir *a*, will be empty, and the piston *b*, will consequently be at the bottom of the reservoir; and as the tube *e*, *e*, and the upper part of the lamp is connected to the piston, the under side of the cup *l*, will rest on the top part of the stuffing box *a**; in order, therefore, to supply the reservoir with oil, the perforated part *m*, *m*, which surrounds the lower part of the burner, must be raised up or removed, and the oil poured into the cup *l*, from whence it will pass down the inside of the tube *e*, through holes or openings made in the lower part of the latter, on to the top of the piston. When the proper quantity of oil has been poured in, which will be at once known by the level rising into the cup *l*, the upper part of the lamp must be raised by hand, whereby the piston will be drawn up, and the oil which was poured on to the upper part of the piston will, by the pressure of the atmosphere, be caused to pass between the sides of the piston and the chamber, and through the holes of the perforated metal plate *d*, to the under side thereof, in order to fill the vacuum which would otherwise be formed beneath the piston. The weight *c*, of the piston, and also the weight of the upper parts of the lamp, being allowed to act upon the

surface of the oil, the latter will be forced up through the centre aperture of the perforated plate *d*, and the narrow pipe *f*, to the burner and wick; and if a greater quantity of oil should be supplied to the burner than the wick can consume, the superfluous oil will run over, and flow down the outside of the burner to the gutter *o*, from which it will drop into the cup *l*, and, descending the tube *e*, will fall on to the top of the piston, from whence it may be transferred to the under side, by simply raising the upper part of the lamp a trifling distance; upon doing which, the pressure of the atmosphere will force the oil past the edges of the piston to its under side as before. The supply of oil up the pipe *f*, to the burner may, however, be regulated by means of the stop-cock *g*, to such a nicety that the wick shall always be supplied with a sufficient quantity of oil, but an excess or overflow will be prevented.

At fig. 3, a modification of the plan above described is shewn, in which the upper part of the lamp remains a fixture, and forms no part of the weight that forces the oil up to the burner. In this plan the weighted piston *b*, is suspended from a band, strap, cord, or chain *p*, the upper end of which passes over and is attached to a pulley *q*. When the lamp is empty or requires a supply of oil, the lower end of the piston-weight *c*, will rest upon the bottom of the reservoir *a*; the oil must then be poured into the cup *l*, from whence it will descend on to the top of the piston, which is wound up by means of a key, applied to the square head of the shaft of the pulley *q*. As the piston is drawn up, the oil will pass to the under side thereof, as in the former instance; and as the reservoir *a*, when not supplied with oil, will contain a quantity of air which will always be at the under side of the piston, the oil will occupy the space of the reservoir with a column of air above it. When the piston is released, it will, by its weight, press on the column of air immediately below, and by that means force the oil up the supply-pipe *f*, to the burner. It should be observed that the pipe *f*, is furnished with a stop-cock *g*, to regulate the supply of oil, as in the former instance.

The patentee claims, the combination or arrangement of

parts above shewn and described, and constituting a self-acting gravitating fountain lamp.—[*Inrolled in the Petty Bag Office, April,* 1847.]

Specification drawn by Messrs. Newton and Son.

To WILLIAM MALINS, *of Mansion-house-place, in the city of London, and West Bromwich, in the county of Stafford, iron-master, for improvements in constructing roofs and other parts of buildings of iron or other metals, and in the preparation of the materials of which the same are or may be constructed.*—[Sealed 18th November, 1845.]

THIS invention consists, in the first place, in preparing or shaping the sides or side edges of the metal plates (of which the patentee proposes to construct roofs and other parts of buildings) in such a manner that they may fit or lap over contiguous ones, and prevent any water or rain, that may fall on a roof constructed of plates so prepared or shaped, from running through and injuring anything that may be covered by the roof. The rafters are also prepared by rolling or bending up the sides, so as to form a groove underneath, which may be either filled with a strip of wood, if thought necessary (as would be the case if the under side of the roof were to be covered with plaster), or the grooves of the rafters may be left vacant, if the roof is merely temporary, or intended for an outbuilding. The invention consists, secondly, in a novel or improved mode of connecting together the several parts of which the roof or other part of the building is composed, so as to form a cheap, secure, and light structure, which may be put together or taken to pieces with great expedition, but which also may, if required, be so fixed as to remain permanent. The material employed for this object is the patent galvanized iron.

In Plate XIX., various views are given illustrative of the method in which the several parts are to be prepared for constructing roofs or other parts of buildings. Fig. 1, represents a transverse section of a side rafter, which may be used either to support a roof or to carry the side plates which form the sides of a building; and fig. 2, is a side view of part

of one of these rafters. By the section fig. 1, it will be seen that the rafter is hollow, and that it is formed of a strip of sheet or plate iron of suitable thickness, rolled or bent up into the required form, as shewn in the figure: by this means great strength and rigidity, with lightness of material, is obtained. These rafters are also furnished with staples or screwed bolts at convenient distances apart, which, by passing through corresponding holes made in the plates, support these latter in their places, and will yet admit of their removal with facility when required. Fig. 3, represents a transverse section of the longitudinal ridge-piece which runs along the ridge of the roof; to this ridge-piece the side rafters which carry the roof-plates are connected, as will be hereafter described. Fig. 4, is a transverse section of one of the galvanized iron or other metal plates which form the covering of the roof or other part of a building. These plates, it will be seen, have their side edges bent or rolled up in a peculiar manner, for the purpose of resting on the side rafters, and at the same time overlapping each other, so as to prevent water from getting through the joint.

To construct a temporary roof (of the materials above described) for covering hay or corn-stacks, in place of canvas, the following plan is adopted:—Take, first, a ridge-piece *a*, such as at fig. 3, of a suitable length, according to the dimensions of the stack, and after having supported it, either by placing it on the top of the stack or by props at both ends, apply the side rafters *b*, *b*, which are furnished at one end with a hook *c*, as seen in fig 2. The hook at the end of the rafter is dropped into a hole or socket made in the ridge-piece, as shewn at fig. 5, and is thereby supported in the manner shewn at figs. 5, 6, and 7. Fig. 5, represents a transverse section of a temporary roof, and fig. 6, a plan view of part of a roof. When the side rafters *b*, *b*, have been secured in their proper places by means of the hooks *c*, at their ends, the metal plates (such as are shewn at fig. 4,) are placed on the rafters, and are supported in their places by the staples or screwed bolts *d*, *d*, of the rafters, which staples or screwed bolts pass through holes made in the side ridges of the plates. The side ridges of each plate cover or are covered by the side

ridges of the adjoining ones, so that the staples or screwed bolts *d, d,* of the rafters *b, b,* pass through the holes of both plates, which, for this purpose, are made to correspond. The plates are then further secured by inserting pins or cotters in the staples, or by means of nuts, when screwed bolts are used; and the lower ends of the upper rows of plates of course overlap the upper ends of the row of plates immediately below; and when all the plates on both sides of the roof have been properly secured, a ridge-covering or crest-piece *e,* is placed over their upper ends. When the roof is intended to be permanent, then the ridge-piece *a, a,* should be supported by the rafters *b, b,* in a different and more secure manner, such as, by abutting against the said ridge-piece, which, for this purpose, should be made rectangular instead of curved, as shewn in the figure; and as it may also be necessary to ceil the inside of the roof, the rafters *b, b,* are lined with slight timbers, which are placed in the hollow of the said rolled or bent-up rafter, and there secured by the staples or screwed bolts above described, as shewn in fig. 8; to which timbers the laths may be nailed in the usual manner.

The sides or ends of buildings are constructed in precisely the same manner as the roofs; but the rafters must be firmly secured below, and the proper means taken for maintaining them in a vertical position, as will be well understood by all builders.

The patentee, in conclusion, states, that although various metals may be employed for constructing roofs and other parts of buildings upon the improved plan, he prefers to construct all the metal parts of galvanized iron, as, by the employment of this article, a strong, light, and durable building may be erected in a very economical manner. He claims, constructing roofs and other parts of buildings, and preparing the materials of which the same are composed, in the manner above set forth, and so as to be quickly applied for the protection of hay, corn, or other agricultural produce. —[*Inrolled in the Petty Bag Office, May,* 1846.]

Specification drawn by Messrs. Newton and Son.

To RICHARD TURNER, *of Hammersmith Works, Dublin, and Bath-place, New-road, in the county of Middlesex, wrought-iron manufacturer, for improvements in the construction of roofs of railway stations and roofs and floors of other buildings.*—[Sealed 15th December, 1846.]

THIS invention consists chiefly in constructing roofs, either in curved or straight lines, of materials not hitherto used in combination, namely, galvanized and corrugated iron sheeting supported by malleable iron ribs, principals, or supporters.

In Plate XIX., fig. 1, is a longitudinal section of part of a roof constructed according to this invention, and fig. 2, is a transverse section of the same. The roof in ordinary cases rests on side walls *a*, but longitudinal beams *b*, and arches *c*, are also proposed to be used for supporting the roofs in valleys where more than one span of roof is required: the walls, in the latter case, supporting the outer edges of the roofs, and the longitudinal beams *b*, and arches *c*, sustaining the inner edges of the roofs (see fig. 2). The beams *b*, and arches *c*, are made of malleable iron, of the section shewn at fig. 3, or that shewn at fig. 4, and strengthened, when requisite, by rivetting on side plates, as indicated by the dotted lines *d*; the beams *b*, are formed with dovetailed ends, which are inserted in the heads of the cast-iron pillars *e*; the arches *c* are bolted and leaded at the ends in the sockets *f*, cast on the pillars *e*; and the space between the arches and beams is filled with iron-work *g*. These beams, arches, and pillars may be used instead of walls at the sides, if preferred.

The malleable iron principals or ribs *h*, for supporting the corrugated and galvanized iron sheeting, are made of the section represented at figs. 3, or 4; they may be either in straight or curved lines; and they are secured to the walls and longitudinal beams by their ends being leaded and bolted in cast-iron sockets *i*, fastened to the walls and beams. The ribs and sockets may be constructed as shewn at fig. 5, when considered expedient. Where the span of the roof is too great to admit of each rib consisting of one continuous bar, the rib is to be made in two parts, and these are to be united

together by bolting and leading the ends in double cast-iron sockets *j*; above these sockets is a ridge-piece *k*, of corrugated metal, which covers a longitudinal opening left in the roof for the purpose of ventilation. The ribs are tied to each other, throughout the whole length of the roof, by malleable iron purlins *l*, which also serve to support the glass skylights *m*; and when a greater degree of stiffness is desired, hollow iron bars or pipes *n*, are introduced between the ribs, and a continuous tie-rod extends through the pipes and ribs from one end of the roof to the other. The lateral pressure of the roof is sustained by malleable iron ties *o*, secured to the sockets *i*, *j*, and with these ties as many trusses or struts *p*, are connected as may be required to sustain the ribs under the weight of the sheeting and skylights.

The gutters for receiving the rain-water from the roof are bolted in cradles at *q*, and the water is discharged from them through iron pipes in the side walls and through the pillars in the valleys. The plates of corrugated galvanized iron that form the covering of the roof are fastened by galvanized iron bolts to the lips of the gutters, to the purlins *l*, and at as many other parts as may be necessary, according to the span of the roof; and they are attached to each other at the joints by galvanized malleable iron rivets, bolts, and washers.

The patentee proposes to use malleable iron beams of the section shewn at fig. 8, (sometimes termed the "deck beam," because it has been employed for sustaining the decks of ships), and strengthened, when requisite, by side plates *e*, for supporting floors and walls of buildings, instead of wooden or cast-iron beams or masonry.—[*Inrolled in the Inrolment Office, June,* 1847.]

To JOHN KEELY, jun., *of Nottingham, dyer and lace-dresser, for improvements in dressing or finishing lace and other fabrics.*—Sealed 14th December, 1846.]

THIS invention consists in the application of shellac to the dressing or finishing of lace and other fabrics requiring a similar dressing or finishing. By this mode of treatment it

is stated that the fabrics when made up will not be liable to absorb moisture from the atmosphere, but will preserve their shape when exposed to heat or damp.

Five pounds of shellac are dissolved with one pound of borax in three gallons of hot water, by first introducing the borax into the hot water, and, when it is dissolved, adding the shellac, keeping the solution at a boiling heat, and stirring the same until the shellac is dissolved. The shellac may be dissolved in or by other alkalies, and in different proportions to the before-mentioned. The solution of shellac may be used alone, or, when thought desirable to give a greater degree of stiffness or body to the fabric, it may be mixed with starch, gelatine, glue, or other stiffening material, which should be dissolved by the ordinary methods, and then stirred into the solution of shellac while the latter is at a boiling heat: the quantity of stiffening material added will vary according to the degree of stiffness required; but the addition of a solution of one pound of glue to a solution containing one pound of shellac has been found to answer well. The solution is applied by dipping the lace of other fabric therein, or by laying or spreading it upon the fabric; and the finishing is proceeded with and completed in the manner now adopted when the ordinary materials are used.

The patentee claims, as his invention, the application of shellac in dressing or finishing lace and other fabrics requiring similar dress and finish, as above described.—[*Inrolled in the Inrolment Office, June,* 1847.]

To Louis Sylvain Gonin, *of Paris, in the kingdom of France, manufacturer, for improvements in printing stuffs, paper, and other matters.*—[Sealed 21st December, 1846.]

This invention relates to the printing of patterns upon paper and fabrics; it consists, firstly, in a method of arranging and applying guides for the printing-blocks to hand printing-tables, by means of which the workman will be enabled to print with a greater degree of certainty and speed than

with the common hand printing-tables; and, secondly, in a mode of regulating the tension of the paper or fabric whilst it is being unwound from one roller and wound on to another, during the printing process.

In Plate XIX., fig. 1, is a longitudinal section of a printing-table, with the improvements applied thereto; fig. 2, is a plan view of part thereof; fig. 3, is an edge view, and fig. 4, a plan of one of the guide-pieces, hereafter described; fig. 5, is an edge view, and fig. 6, a plan of the under side of a printing-block: figs. 2, 3, 4, 5, and 6, are drawn on a larger scale than fig. 1. *a*, is the printing-table; *b*, is a frame, on the front rail *b**, of which the arms of the workman rest; this frame supports a rule or guide-bar *c*, that extends across the table *a*, and is perforated with small holes *d*, to receive the bolts *e*, used for fastening on the guide-pieces *f*; and the bar *c*, has a slot at each end, through which a screw-bolt passes, for the purpose of fixing it to the frame *b*, at any required distance from the front rail. Each guide-piece *f*, has a small hole *g*, to receive one of the pins *h*, of the printing-block *i*, so as to ensure the correct application of the printing-block to the required part of the paper or fabric.

The method of unrolling the fabric to be printed, and rolling it up after being printed, is as follows:—The fabric *j*, is wound upon the roller *k*, and from this roller it is caused to pass over the rollers *l*, *m*, the table *a*, and the rollers *n*, *o*, *p*, to the roller *q*, around which it is to be wound. On the axes of the rollers *k*, *q*, are fixed pulleys *r*, *s*, and around these are wound the ends of the cord *t*, which passes over the small pulleys *u*, and is kept constantly stretched by the weight *v*, in order to keep the fabric at the requisite degree of tension as it is unwound from the roller *k*, and passes over the table to be printed, and to wind it on the roller *q*, after it has been printed. The fabric is supported in its progress by a cloth *w*, which starts from the roller *x*, and passing over the rollers *l*, *m*, table *a*, and rollers *n*, *o*, is secured to the roller *p*.

The following is the mode of operating with this apparatus:—The guide-bar *c*, having been fixed in the required

position, the workman draws the fabric over the table, and prints a portion of the same, by inserting the pins *h*, of the printing-block in the holes of the guide-pieces *f*, and pressing the block upon the fabric; he then turns the roller *n*, by means of a lever, and thus causes a further portion of the fabric to be unwound from its roller *k*, so as to present a fresh surface to be printed on, while at the same time, the fabric is wound upon the roller *q*, by the action of the cord *t*. By this arrangement the workman will not be required to change his position, and he will at all times be enabled to work with accuracy and speed.

The patentee claims, Firstly,—the mode of arranging guides to hand printing-tables, whereby the workman is enabled to print paper and other fabrics with a greater degree of certainty and speed than with the ordinary hand printing-tables. Secondly,—the mode of regulating the tension of the fabrics whilst being unwound from one roller and wound on to another, as above described. Thirdly,—arranging the guides *f*, to a hand printing-table, in combination with the system above described, for regulating the tension of the fabrics, when being unwound and wound on to the rollers.—[*Inrolled in the Inrolment Office, June,* 1847.]

Scientific Notices.

ON THE DEVELOPMENT OF MECHANICAL SCIENCE.

POLITICAL economy, equally with that endless source of national perplexity—the currency, is a subject the mysteries of which few, even at the present day, venture to fathom; but too much like the timid landsman on the inconstant element, aware of the dangers which might result from his ignorant endeavours at the ship's helm, the public is ever ready to be guided by the opinion of those whose skill or audacity prompt them to become leaders. Such being the case, it is not strange that in a country like Great Britain, where interests are so complicated and diverse, and where change is constitutionally inimical to the mass of the people, little difficulty was found by demagogues in implanting a

deep-rooted feeling against the employment of machinery in general,—and that, from the prevailing apathy to enquire into the real bearings of the case, the most palpable advantages should fail to eradicate the prejudice raised against this intruder into the fields of industry.

It required no great endowment of nature, or deep and searching study, to discover that labor was a means to wealth and happiness; the inference, therefore, which was drawn from this undisputed proposition, and for a long period continued to be the reigning opinion, was, that whatever tends to throw the laborer out of his accustomed calling must be a national evil; inasmuch as the community is compelled to keep those in idleness who heretofore were able to live by the efforts of their own industry. However much we may flatter ourselves with the evidences of a growing desire for intellectual cultivation, the present is certainly not the age to trace the rise, progress, and annihilation of this fallacious deduction (which is only obtained by taking a microscopic view of our social system); for we shall find that many professors of political economy, who have expended much time and patience, if not in studying the subject, at least in explaining the enigmas of this science to the uninitiated, are still believers in the general principle, that what man is capable of performing by his unassisted labor, should be preserved as a kind of birthright to the species. In order, however, to retain disciples to this doctrine, which increasing knowledge serves to render the less tenable, it has been found necessary to make reservations in certain cases; for instance, the plough having from time immemorial been used in the tillage of the ground—that machine may be retained, although a greater amount of human labor might be expended if resort were had to that more simple instrument the spade; the argument for a return to the spade (a desire for which is not unfrequently met with) being, that better crops would result. The unexampled progress which has been made during the present century, in machinery of all kinds, has, by its very excess, tended in no small degree to eradicate the feelings of alarm which were formerly studiously implanted in the public mind by these short-sighted human labor monopolists, at every advance in mechanical science; for it is now found that, like the morass impelled by its own inherent growth over the ancient limits which marked it from the neighbouring plains, where industry had heretofore rejoiced, so is the forward movement of mechanical science—as yet but partially

developed—equally resistless, and that those whose rashness urges them to stay its course, only involve themselves in ruin.

It would be curious to contemplate, if it were possible, the degree of civilization which, in the scale of social advancement, forms the *beau ideal* of the political economists, whose glowing love for their fellow creatures prompts them, at all risks, to strive for the continuation of their ignoble pursuits, which inanimate matter may be made more effectually to perform. Independent of any desire to improve the intellectual condition of their species, they surely must, as philosophers, admire the wonderful structure of the human body, and the inexplicable connection between the mind and the moving parts, which together constitute a self-acting and self-controlling machine; and yet they cannot conceive that such powers may be better applied than to the thousand monotonous and debasing pursuits for which machinery is so eminently calculated: they *would* prefer the labor of the one which, from its liability to exhaustion, must necessarily be unequal, and which does not *call forth* that most valuable and exclusive property—*intelligence*, to the untiring and continuous exertions of the other, which *will* retain its powers so long as order is preserved throughout its various parts. In other words, man, whose destiny is to subdue the earth, must, according to these pretenders to political economy, tax his strength to compete with matter endowed neither with instinct nor with life. It is not our purpose here to meet the disadvantages which machinery, in the disturbance of the settled courses and beaten tracks of human labor unquestionably occasions; for the adjustment of such matters must be left to our legislators, whose position for attaining the requisite knowledge whereby to guide the common weal, and whose acknowledged or presumed ability to correct social disorganization unquestionably point them out as the only suitable regulators of such matters;—our object is merely to shew that the introduction of machinery as an assistant to human labor, is a natural effect of the advancement of civilization,—an advantage not only to the introducer but to the community at large, although in individual cases it may cause distress.

It is now very generally conceded that the power by which a nation creates its wealth is its labor; and that the quantity of wealth created will increase in direct proportion as the power increases; yet, even in the minds of many who subscribe to this doctrine, which Adam Smith so ably propounded, some

reservations are made in favor of the old popular prejudices against machinery. These latent feelings existing, independent of the judgment, and perhaps unknown to their possessor, are calculated, when aroused, to assist the imagination in adding the hideous proportions of a human monster to any ingenious mechanic, who may be laboring to adapt machinery to some branch of industry which has hitherto been beyond its range, and mark him out as a victim for popular indignation. We may rationally hope that the time is past for consigning machinery to the flames, or attempting to cripple its progress by taxation; and that now a more healthy feeling on this subject prevails, not only in the educated and refined classes, but also among our artizans. Better evidence cannot be given of the return to reason of the laboring classes of the community than the fact that a portrait of "the father of lace machinery" is prepared to adorn the walls of the Nottingham Mechanics' Institution, although the living man was virtually banished from that town. If it were necessary we might point out stronger foundations for the prejudice against machinery than the general dislike and inconvenience of change,—jealousy among the rich of rising opulence—the clashing of rival interests—the injurious effects arising from over production, whereby thousands become periodical paupers, and are thrown upon the bounty of those who have received no direct advantage from their labor—these and many other causes have implanted a hatred to the innovations of machinery, incapable of being eradicated from the present generation. Yet, if we look back on the last fifty years of our history, we shall find our national prosperity has steadily advanced, the increasing population has found increased employment, and those branches of manufacture which formerly were scarcely more than domestic amusements, are now the means of sustaining thousands of families. We are far from wishing to see what are termed *par excellence* the industrious classes sitting idle, whilst machinery is going through their accustomed avocations, but we think they would be fully as well employed in grinding the wind on a tread-wheel, as in exercising their strength in competition with the superior powers of mechanism. Had it not been the lot of England, so peculiarly adapted by its position and the genius of its people for commercial enterprize, to become the central point for inventive skill, the national prosperity might by this time have been very questionable; for bankrupt in purse if not in honour, we should now perhaps be waning fast into the regions of obscurity, leaving to some more fortunate nation the envied position which we had lost. If,

then, such was likely to have been our fate (and we can see no prospect of other fields of industry equally productive to those which machinery has opened up for our redundant population), it follows that the inventor must not be regarded as the bane of his species, but on the contrary, he is deserving esteem as a national benefactor—he is a "gentle monster," and when dead his worth will be appreciated.

Machinery, as must be evident to every intelligent observer, has to us, as a nation, this superiority over the soil, which, by the French economists, was considered to be the only source of wealth, viz., that its power of production is unlimited; whereas, our territory, or rather that portion of it accessible to the industry of the great mass of the people, is confined within very narrow limits: we have no "far West" to clear and cultivate, and therefore the demand for agricultural labor cannot, by any ingenuity of man, be greatly increased. Now every improvement in machinery must have one of these two effects, either to cheapen the manufacture produced or to improve its quality. In either case an inducement is held out to purchasers, whereby a larger demand for the manufactured article is created, and perhaps a new market is found for this cheap or rare commodity. A direct and manifest advantage to the labor market is therefore the result of this improvement; for more hands are necessarily required to assist in the construction and repair of the machinery to produce, and also to guide and direct such machinery whilst producing. We might, with some speciousness shew, that if England failed to possess itself of such advantages, calculated to enrich her own children, other nations would not let slip the opportunities thus left for their acceptance; but we pass by this ground of argument in favor of machinery, as the fact of any other nation possessing the power to seize upon such advantages might be disputed. For not only is the inventive faculty requisite,—a faculty which, strange to say, is confined to no race or nation, but is the offspring solely of *necessity*—but persevering industry, established wealth, and, above all, a vent for the article produced, are the requirements for a nation desirous of advancing to great manufacturing prosperity.

It would be tedious, even it were in place, to enter minutely into the character and peculiarities of the labor market; for our present purpose it suffices, if what must be clear to all who have ever thought on the subject is admitted, viz., that when the supply is greater than the demand (an effect not to be overcome by the most skilful legislation), wages

will inevitably fall. The cause of this is sufficiently obvious, — there is no fund on which to hold back, — the great capitalist, the soul of all profitable exchange, is in this most important market wanting. In speaking thus of labor in the abstract, we are considering the case of those who are capable only of following such occupations as require no great amount of skill, but which may be more or less efficiently filled by laborers generally. Now it is evident, that so long as the demand is below the supply, the price for such labor, instead of being sufficiently remunerative, will only keep above the line which separates want from starvation; and all that philanthropists can do will have no permanent effect in removing this evil. If, however, machinery is introduced to perform the work, at a price against which it would be folly for human labor to compete, it follows that that branch of labor must be abandoned, and thus, by compulsion, a number of our operatives will be emancipated from the slavery into which circumstances had thrown them, while a premium is offered to the most intelligent, who are sure of being retained to tend upon the machinery. The immediate results of such a revolution in any great channel of industry is much to be regretted, but in a land like Great Britain, where public and private bounty is so accessible, the evil of apparent destitution will weigh little against the good to be anticipated from this emancipation. After a long personal acquaintance with the progressive improvements in mechanical science, our experience warrants us in stating, that machinery, by its introduction to new branches of manufacturing industry, has not only been a boon to the community, but has added greatly to the comforts of the laboring classes by increased employment, by superior average wages, and by the diminished cost of the articles so produced.

If in the above remarks (which are rather an index to facts in the memory of all, than a direct appeal to the judgment) we have shewn that the introduction of machinery as an assistant to hand labor is not an evil, but rather a good, inasmuch as a demand for such labor (and that not of the most arduous kind) follows the advance of any new manufacture, the success of which itself proves the advantage gained to the community,—it is obvious that the greatest encouragement should be given to enterprises of such a nature, and that however great may be the pecuniary reward of successful ingenuity, the recipient of such fortune should not be considered as having enriched himself at the expense of the laborer, but rather, that being the discoverer of a mine of

wealth hitherto unknown, he worked it first for his own advantage, and left it afterwards for the benefit of all.

It is with cheerful hopes rather than with desponding fears, that we view the prospect of a speedy introduction into England of machinery calculated to act upon two branches of oppressed industry, hitherto without the pale of that mighty renovator. The inventions to which we allude come from that exhaustless source of ingenuity the United States of America, which country, by its peculiar wants, has been forced into a successful rivalry of the old world. Nowhere can we see the truth of the old proverb, "necessity is the mother of invention," so fully borne out as in the States,—for the demand for labor being there greater, instead of, as in every other civilized country, less than the supply, the powers of machinery have been more eagerly taxed than in Europe, to fill up the deficiency. The consequence of this is, that even domestic labor receives a considerable share of assistance from the inventor; and, if we are to put faith in the advertizing columns of the "*New York Sun,*" any family may for a few dollars be furnished with a supplementary nurse, in the form of a "mechanical baby jumper," warranted to perform the task with an elastic freshness vastly superior to the jaded limbs of the human operator. Foibles of this kind, which are occasionally to be met with among the numerous inventions yearly patented in the United States, tend to shew the bent of the national mind for mechanical science, by evidencing that those who are incompetent for greater things will not overlook minor subjects. It is not, therefore, to be wondered at, that in attempting to realize the comforts which long use has made familiar to the people, but which, from the dearness of human labor, they are compelled to make great sacrifices to obtain, some curious mechanical discoveries should result;—one we will instance is a machine for making straw plait. This manufacture, as hitherto carried on in England in the counties of Hertford and Bedford, has been produced solely by the fingers of the operative, and perhaps no attempts have here been made to apply machinery to such work; the straw being of so brittle a nature as to require the most careful treatment. American ingenuity has, if we are rightly informed, surmounted the difficulty, and we look with no little curiosity to the arrival of a perfect-working straw-plait machine, the construction of which is already familiar to us, and presents no features that would induce us to question its success. With respect to the second machine to which we alluded as likely to effect a branch of industry at present untouched by

machinery, we are able to speak of that more confidently, as we have not merely witnessed its performance, but have personally (howbeit we are all unpractised in the sempstress' art) effected the junction of pieces of cloth with such expedition, regularity, and strength of stitch, as would make any tailor in Christendom marvel. The work produced by this sewing machine bears no analogy to the running stitch heretofore obtained by machinery, but two threads are employed, which interlace each other, and produce a better stitch than is ever put into woollen clothes. The inventor of the machine is now preparing a traversing frame, of a peculiar construction, to carry the work, and when completed he will be enabled to form a seam of any required shape, even to a convolute, if such were wanted. Many years may pass before the persevering labors of the respective inventors of the straw-plait and sewing machines may effect any great change in the branches of labor they are attempting to improve; but that these, and many other such occupations which are filled by persons earning scarcely a bare subsistence, will be eventually performed by the aid of machinery, no doubt can be entertained by any who are acquainted with its powers. Then will the philanthropist, having witnessed among the masses of his own country the exchange of bodily toil for mental activity, strive to complete, by the introduction of the giant power of machinery into foreign climes, what the moral feeling of Great Britain was enabled successfully to commence—the extinction of slavery; and the Brazilian planter, although perhaps possessing no common feeling with the civilized world but the sordid one of avarice, may, through that passion, be induced to strike the fetters from his slaves, and teach them to direct and govern the power which produced their freedom.

Correspondence.

To the Editor of the London Journal of Arts.

SIR,

THE article in the June number of your Journal, relative to the Patent Laws and the Non-ornamental Designs Act, opened up subjects of the greatest importance to inventors; perhaps, therefore, you will kindly allow me a space in your pages to say a few words more upon the same points. The object you have mainly in view seems to be to point out the perplexity which has been occasioned by the clashing of the recent Designs Act with the Patent Laws. As, however, it appears to me that your remarks in the pursuance of this object, may be misconstrued by some

persons into an imputation of doubt and uncertainty against the patent laws, I propose to offer a few observations, with a view of counteracting any such erroneous impression. You state, "that some inventions may with propriety be secured under either statute," that is to say, some inventions come within either definition—"any manner of new manufacture"—or, "any new or original design for any article of manufacture having reference to some purpose of utility, so far as such design shall be for the shape or configuration of such article."

In order then to understand the effect of this statement, we must know in what sense the word invention is to be taken,—it will therefore be useful to make this enquiry. As regards the meaning of invention capable of being secured under a patent, we have abundant reasons for assigning to it a scope equivalent to any idea that may be suggested by the words "principle embodied in a practical form." On a review of the whole catalogue of patent causes that have been tried in Courts of Law, we find a body of concurrent testimony, to the effect that the man who first practically adapts and applies a principle to any useful purpose may secure to himself the whole of that principle so applied, as an embodied principle, and not simply as a mode of embodying a principle. Invention then, under the patent laws, goes the length of embracing any substantive feature of novelty applicable to a manufacture; the latter word extending to anything made either by hand or by machinery. At the same time, however, that an invention under a patent may include this wide signification, it does not necessarily do so; there is nothing to prevent a man from taking out a patent for a mere matter of detail, if he be so disposed;—he may confine himself within as narrow a compass as he pleases, provided only his invention contain a substantive feature, which constitutes it a new manufacture. Now, in what sense is the word invention to be understood, as coming within the definition contained in the Non-ornamental Designs Act? The matter or thing invented must be a new or original design for an article of manufacture,—not a manufacture itself, as in the former case, but only a design applicable thereto; and the possibility of extending the word design beyond the idea of shape or configuration is expressly guarded against. Still the design is not confined to external shape, since the article of manufacture to which it is to be applied is defined as "having reference to some purpose of utility," as distinguished from mere ornament. Invention then, under this Act, signifies a particular form or shape of useful article of manufacture; the utility resulting from the form.

Such being the different senses in which the word invention is to be understood under the Patent Laws and the Designs Act, how far is it right to say that an invention may be "secured under either statute?" Only so far as it implies a form "having reference to some purpose of utility."

In a pamphlet recently issued from your office, and containing, as I presume, your opinion on the laws relating to the Copyright of Designs, a particular form of paving block of wood or stone is given as an illustration of this point, and it is stated that such an article is "unquestionably a fit subject for registration;" and further, that the said block, being an article so formed as to answer a purpose of utility, it is a manufacture, and therefore a subject for a patent. Now, Sir, I think the proposition so stated requires guarding from misconstruction, lest it should be hence inferred that it is immaterial, as regards scope of protection, whether the invention be secured under a patent or under a registration. If secured under a patent, the specification might claim the principle contained in the form of block, in its application to a road or way, if that principle were new; or the construction of a road or way by the use of such blocks in combination; whereas, the same invention under a registration could only be protected to the extent of including the particular form of block, and not the construction of a road or way. Of course, if the principle involved in the form of block were old, the patentee could only claim the particular form represented, but he could still claim the construction of the road or way formed of such blocks, which might perhaps be combined in some novel manner, and so form a new manufacture. It is evident then, that although the same invention may come within the definition in "either statute," yet, unless greatly crippled by peculiar circumstances, the claim under the patent may be much broader than that under the registration; the one extending to the manufacture itself, and the other only to the form or shape of any article of manufacture.

Still, although the Patent Laws, in principle, are much wider in their scope of protection to invention than the Registration Act, yet, in practice, there is one aspect of the question which presents serious difficulties to the view of the patentee. A person may have invented some useful principle of application of a very simple nature, but he cannot secure it under a patent in less than a month (on the average); another may prepare a specification and register some one form of this principle in two or three days. When the patentee comes to specify his invention, he finds his principle published to the world under the registration, and himself restricted in his claim to the mode or modes by which he carries the principle into effect, unless he is able to shew that the form of parts claimed under the registration fell short of embodying the entire principle. In many cases the discussion of this question would no doubt involve points of great intricacy, especially as the Registration Act itself seems incapable of anything like satisfactory interpretation, as respects its scope of protection.

Again, on the other hand, the present state of things suggests matter for apprehension to the inventor availing himself of the

protection apparently provided in the Registration Act. If he look at the list of sealed but unspecified patents, he is likely to experience much difficulty in knowing for a certainty, from the titles, whether that which he is about to register may not form part of some already patented invention, which he will unconsciously infringe by putting his own invention in practice.

He then, as well as the patentee, is deeply interested in the due adjustment of the laws relating to patents and designs, so as to prevent the great and increasing evils resulting from their present inharmonious operation. Respecting the particular nature of the required amendment, I will not now venture to pronounce an opinion; I will only add a suggestion which seems to me to be of much importance in its bearing upon the question. The patent laws, as we now understand them, practically, have grown out of a particular restriction of an old prerogative of the Crown, derived from the common law of granting monopolies; the terms of which restriction have since been clearly defined by different judges, in such a manner as to point out conclusively how far a grant of patent right is capable of extending. We have therefore, for all practical purposes, positive notions respecting the law of patents, derived from a long list of precedents, unencumbered with direct statute law. The various arrangements in the process of securing patents, by which considerable time is consumed, being evidently not of the essence of the patent laws, whatever alteration it may be deemed advisable to make, might be made in them without interference with the spirit of those laws as above expressed, which it is desirable to preserve inviolate. At the same time it may be observed, that the mode of making the grant ought to be duly guarded, as far as possible, against every species of false practice on the part of the petitioner, and the dignity of the Crown ought not to be compromised by any undue facilities for the mere sake of gaining time.

Again, as respects the law relating to copyright of designs for articles of utility, all we know about it rests upon a single statute, which it appears no one is able thoroughly to understand. We have no intelligible precedent from which to gather any conclusive principle of interpretation respecting its provisions. Surely then any question of amendment, as between these two conflicting laws, suggests the idea that the essential change must be in that relating to copyright of designs for articles of utility.

Yours, &c.,

A Reader of the Journal.

MEMOIR ON GALVANIC ELECTRICITY.

BY M LEDEAU.

[*Translated for the London Journal of Arts.*]

THE object of this memoir is to enquire into the causes of galvanic electricity and their modes of action.

The author commences by examining the objections raised

against the principle of Volta, and says that all those objections were done away with on an attentive examination of the facts. Parties experimenting with the galvanometer only, and observing that the current changed its direction according to the liquid employed, concluded, from this change, that electricity in tension (*électricité de tension*) was disengaged upon each of the metals forming the circuit. This conclusion was erroneous,—and this may be easily verified by employing electroscopes, with gold plates, together with the galvanometer. Whatever may be the direction of the current and the nature of the liquid in which the voltaic battery is immersed, the electricity of the metals is the same, and in conformity with Volta's principle. The principal argument against this principle is therefore based upon an error.

Chemical action is undoubtedly a cause of electricity. Sometimes it acts in opposition to the electro-motive force of contact, and at other times acts in conjunction with it; thus producing the contrary currents.—In a word, the electric current is the result of various forces.

A striking example of the difference of action of these forces is seen by placing iron in concentrated nitric acid, together with a plate of gold or platinum, with which it communicates by means of the acid only. The gold is positive, and the iron negative, when the latter metal is attacked; but if the iron is rendered passive, that is to say, unattackable by nitric acid, it is this latter, on the contrary, which becomes positive, whilst the gold becomes negative. This reversal of the electricity only takes place when the two metals do not touch. When they are absolutely in contact, the iron, whether attacked or not, is invariably positive, and the gold negative.

This single experiment presents three very different effects, and consequently three different causes, viz.,—1st. The contact of the metals. 2nd. The contact of the metals with the acid. 3rd. Chemical action.

All the other experiments made by the author, and part of which he has reported in his memoir, lead to the same conclusions. After having analyzed them for the purpose of determining the part which each of the above causes takes in the production of the phenomena, he enquired into the law relating to the power of electric batteries. This law is not so simple as Volta has supposed; it does not augment in proportion to the number of pairs of plates, but by reason of the electro-motive force of the bodies in contact, and the electricity disengaged by chemical action.

In the fourth part of his memoir the author reports the results of his experiments upon dry batteries as follows: "I constructed "a large number of batteries of this kind, with plates of copper "and zinc, separated by silver paper, wood, silk, cloth, gum-lac "varnish, and several other substances. My observations were "principally confined to silver paper and gum-lac varnish bat-"teries. I have observed that when the weather is very dry, the "former furnishes a charge about the same as that given by wet

"batteries; with this difference, however, that instead of instanta-"neous contact, half an hour at least would be required to charge "the condenser for a battery consisting of sixty pairs of plates. "Batteries formed in this manner retain the same power during a "long time. This is not the case with batteries in which, instead "of liquid, a layer of gum-lac varnish is applied to either of the "metals; besides the fact of their charging the condenser more "slowly and less powerfully, they produce no effect after fifteen "or twenty days. This has led me to believe, that the multiplica-"tion of electricity produced by dry batteries is based upon the "same principles as that resulting from the liquid batteries, and "is caused not only by the electro-motive force of the two metals "in contact, but also by the chemical decomposition of the body "interposed. Thus, the gum-lac varnish, which separates the "plates of the battery, is really decomposed; this may be ascer-"tained by varnishing the surface of the copper:—some days "afterwards it will be found that the substance which colors it "red has passed to the zinc."

The fifth and last part of his memoir contains various observations on the mode of action of the electro-motive force of metals in contact. This force will traverse the whole of the human body. A man holding in one hand a plate of copper, with which he touches a piece of zinc, will electrify the plate of the condenser which he touches with the other hand. The human body, in this case, as well as in others cited by the author, acts in the same manner as the liquid or wet substance which separates the elements of a battery; and it is suggested as probable that batteries of considerable power might be formed by a number of men holding in one hand a copper hook and in the other a zinc hook, and attaching their respective hooks to one another. This experiment was tried upon eight persons, and the effect was such, that on raising the top plate of the condenser, the gold plates of the electroscope were broken to pieces.

Men thus united act also upon the needle of the galvanometer, and even two persons holding one another's hands, and taking hold with the other hand of one end of the multiplying wires, will cause the magnetic needle to deviate: this is more especially the case if the persons are of different ages or sexes.—[*Comptes Rendus.*]

APPARATUS FOR THROWING A LIGHT OBLIQUELY UPON OBJECTS INSPECTED THROUGH THE MICROSCOPE.

BY M. NACHET.

To persons in the habit of using microscopes, the remarkable effects produced by throwing an oblique light upon objects are well known; for lines or marks which are not distinguishable in a direct light may, by receiving the light obliquely, be clearly

discerned. All microscopes do not, however, admit of this oblique light being equally well given. Some are constructed with a moveable object-holder, and the mirror is mounted in such a manner as to allow of its being turned in any direction around the foot of the instrument; a variable oblique light is thus obtained, but the object-holder is, in this case, not properly supported, nor is it sufficiently firm for delicate operations; moreover, by changing the position of the mirror, in order to illuminate different sides, the light is entirely lost, and the successive effects of the variations in the direction of the light cannot be followed. In other constructions, the object-holder is firmly fixed upon a kind of chamber containing the mirror, which may be moved in any direction, to expose successively the different sides of the object to the light; this is, however, a very trifling advantage, when only perpendicular rays are thrown upon the object, but yet it produces some good effects: in instruments constructed after this manner the mirror is immoveable, and always reflects a direct light.

The little apparatus which I have the honor to present to the Academy, is applicable to the latter construction, and is for the purpose of throwing an oblique light upon the object. It consists of a prism, analogous to that of a *camera lucida*, of such a form that the rays entering parallel to its axis shall undergo two internal reflections, which cause them to diverge, and make their exit perpendicularly to the exit face, to meet the axis at the centre of the object-carrier, in an oblique direction, varying according to the angles of the prism. The apparatus is placed immediately under the object in the tube which serves to support the ordinary diaphragms. In order to obtain a better light, the faces may be curved instead of flat, by which means the rays will be concentrated.

My object in constructing this prism was to allow of an apparatus being adapted to microscopes of the ordinary construction, by which means a person might obtain all the advantages to be derived from a new instrument, and at the same time retain the one which he had been accustomed to use. This oblique light, combined with the rotary movement of the lower plate of the object-carrier, produces a very fine effect. I submit to the Academy an object well adapted for shewing this, viz., a *navicula lineata*, which presents three series of lines: two are oblique, forming lozenges or diamonds; and the third cuts the diamonds diagonally. These lines, which could scarcely be seen with the direct light, even with the best lenses, become quite clear and distinct by using my prism. This prism gives to the rays of light an obliquity of about 30 degrees from the axis: I have found, however, that the same effects are attainable with an obliquity of 20 or 40 degrees, which answers an objection likely to be suggested, as to the apparatus not allowing the obliquity of the light to be varied.—[*Ibid.*]

ON MAGNETIC ATTRACTION, IN SUPPORT OF THE THEORY OF THE UNIVERSALITY OF MAGNETISM.

BY M. DE HALDAT.

M. De Haldat has presented a memoir on magnetic attraction, the principal object of which is to reply to the objections opposed to the theory of the universality of magnetism put forth in a preceding memoir, presented to the Academy in May 1846.

The questions discussed are, 1st, Whether the two modes of manifestation of the magnetic state, as advanced by Dr. Faraday, are proved to be correct. It is here proved that the distinction noticed by Dr. Faraday, as existing between bodies which take a direction parallel to the axis of the magnets, or the direction of the magnetic influence, and those taking a direction transverse to that axis (a distinction discovered in the year 1821 by M. Becquerel), is made known by characteristics which cannot be mistaken, and which appear more evident when, in order to verify them, substances are employed which possess in the highest degree the property of taking these different directions, such as bismuth and copper, in the form of fine wire. It is also proved that these opposite tendencies cannot be attributed to the length of the needles, and are not the result of a combination of forces, as the same effects are evident, whatever may be the length of the substances. Lastly, it is proved that magnets may be produced which will either take the longitudinal or transverse direction at pleasure, by composing them of small fragments of very thin steel needles, and which, being enclosed in glass tubes, may be made to take the required direction by artificial means.

2ndly. The author examined whether this tendency of the bodies to take different directions relatively to the axis of the magnets between the opposite poles of which they are placed, might not be compared to vitreous and resinous electricity; but he found nothing to corroborate that opinion, as all the experiments made with a view of obtaining any of the phenomena of static electricity, by purely magnetic processes, were unsuccessful.

3rdly. The researches which have for their object to ascertain the tendency of bodies to obey the influence of magnets, forming the third part of the memoir, are there advanced as suitable for verifying the presence of iron in bodies. They establish very remarkable differences between the various states of that metal, whether as an oxide, an alloy with either metals or metalloids, or in the form of a salt. In this latter state, the tendency to become magnetic exists in the minimum degree; in several of these substances it does not exist at all; and it is perfect in none. The result of these experiments was, that iron was found to be the most magnetisable body; that the presence of an infinitely small quantity of this metal may be discovered by suspending the body supposed to contain it between the opposite poles of a powerful magnet; and that this method is equally efficient with chemical analysis. The author is, however, very far from con-

cluding, with the partisans of special magnetism, that the phenomena of magnetic attraction necessarily indicate the presence of iron, as compound bodies may be formed in which it cannot exist.

4thly. The fourth part of this memoir is intended to throw a light upon the manufacture of permanent magnets. It contains an explanation of some experiments on the tendency of various qualities of iron to acquire and retain the magnetic influence; and the conclusion is, that the purity of that metal is an essential condition for its acquiring that power, as the tendency to retain it is in exact proportion to the resemblance of the constituent parts of the iron when that metal is in the state of steel.—*Ibid.*

Notices of New Works.

The Tradesman's Book of Ornamental Designs.—Part I. Orr and Co., Paternoster-row; and Menzies, Edinburgh.

THE issue of this work, which is another contribution from the Scottish press, is peculiarly well timed, for the schools of design established in most of our manufacturing towns may be presumed to have now laid the groundwork among our artificers for an appreciation of elegance of design in manufactured articles, by familiarizing the eye with models and drawings from the antique. If we have not hitherto been provided with a work whose pretensions are to guide the taste of workmen in all branches of trade susceptible of beautiful design, we have a variety of pattern books, exclusive in their intention, but embodying, when taken collectively, a large amount of ingenious and tasteful designing: as a favorable specimen, we may instance Mr. Bielefeld's pattern book of papier-maché ornaments, prepared as architectural embellishments. In judging from the getting up of Part I. of "*The Tradesman's Book of Ornamental Designs,*" we should say that no expense will be spared in making it worthy of public patronage, as far as the execution of the illustrations is concerned; but we would suggest that in a work of this kind it is by the talent of the presiding genius, who dictates the subjects to be illustrated, that the prosperity or failure of the publication will be decided. It is not even a refined appreciation of the beautiful in form that will suffice,—there must be also combined with this rare quality a knowledge of the capabilities of each particular manufacture, to reproduce the design submitted for its use; for otherwise many designs, which may be highly approved on paper, will altogether fail in their application to the purpose for which they were intended, from the fact of their not being able to be "got out." The existence of such difficulties should therefore be ever present to the mind of the artist, as well as the effect which a design would have when carried out in different manufactures; as, for instance, an elegant group of flowers, suited for printing in colors, would produce about the same effect when woven into lace as if it

were printed on a sponge; and so will it be found, that this impracticability will develope itself through all branches of the manufactures. Now, if we are to have a tradesman's book, which shall in a manner dictate the national taste on matters that have of late been too much neglected, it is desirable—even if the points we have referred to above are neglected—to secure at least designs which shall be otherwise unexceptionable. It is not our wish to depreciate a work intended to fill up a void which we know to have been long felt by persons connected with the decorative arts, but, in the outset, we would suggest to the proprietors the greater probability of their artists erring in manufacturing new designs, than in selecting appropriate specimens of the various styles as they already exist, and have been approved for ages. It is, in our opinion, the purchaser of the work—the pupil of the school of design, who is to compile, from authentic copies of pure taste; and thus, with such guides for his imagination, to continually test, and thereby improve, the quality of his inventive powers of design. If, however, he is to trust, in his ignorance of anything more than a mechanical facility of drawing, implicitly to the attempts at decoration, which may here be presented as new designs in the style of a past age, he may unconsciously be led to imitate the Elizabethan architectural design, which at once forms the title page and deformity of the work, and proves that its author has yet to learn the simplest rules of perspective and geometrical drawing,—to say nothing of taste, which it exhibits. We have thought it advisable to say thus much of "The Tradesman's Book of Ornamental Designs," because its pretensions are great, and its object in presenting to the artificer "a correct, simple, and copious guide" is desirable to be attained; we should, therefore, as advocates for improvement in the manufacturing arts, desire to see this work successful,—a consummation which cannot, in our opinion, be achieved without dropping the *original combinations* (which may or may not be abortions), and relying solely on the originals, which suggested the newly published designs.

On the Resistance of the Atmosphere to Railway Trains.—By G. H. Bessemer, C. E. J. Weale, High Holborn.

The author, who is favorably known as an ingenious inventor, in this paper gives the result of a series of experiments which he undertook for the purpose of testing the resistance which railway trains, under particular circumstances, have to encounter from the atmosphere. It is well known, from the researches of Dr. Lardner, and the more recent report on atmospheric propulsion by Mr. Robert Stephenson, that the absorption of motive power on railways by the atmosphere increases so rapidly, in proportion to the speed of the train, as to set a limit to the rate of travelling; the enormous loss of power and the consequent cost being so disproportioned to the advantage gained. This fact hav-

ing been well substantiated, our author proposed to himself the task of discovering in what manner the power was absorbed; and the mode in which his experiments were carried out are thus stated:—

"I fitted up an apparatus consisting of a horizontal wheel supported by a vertical shaft which was driven by bevil gear, and connected to a steam-engine. The horizontal wheel was keyed firmly to the shaft, and carried upon it a second wheel very lightly made of wrought-iron, and free to move upon the shaft. This second wheel was placed above the first, and supported upon it by small antifriction wheels of steel attached to the upper one, so that the upper horizontal wheel could revolve with exceedingly little force. One of Salter's spring balances was then attached by its opposite ends to one of the arms of each wheel, so that the two wheels were made to move in concert, excepting when any opposing force was applied to the progress of the upper wheel, when the spring balance served to indicate the amount of such opposing force. But as the indications could not be read off during the experiment, I attached to the index a pencil tracer and card, so that when the apparatus was at rest, the resistance which had been indicated on the card could be read off. Matters having been thus arranged, a model carriage of wood on a scale of one-sixth the size of those in use upon railways was attached to the light iron wheel, and the apparatus put in motion. The amount of resistance opposed to the passage of the carriage through the air was ascertained by the wheel on which it was placed moving on its friction rollers and indicating on the spring balance the number of the pressure. The speed was gradually augmented from the time of starting in each experiment; and when the number of revolutions per minute was attained, which was equal to the number of miles per hour previously determined on for each series of experiments, the speed was gradually diminished till the carriage was brought to a state of rest, when the indication on the card was copied off."

At a rate of 45 miles per hour (the highest speed consistent with the safety of the apparatus), the atmospheric resistance was ascertained to be 10 lbs. per superficial foot. A second carriage was now added, and at the same speed an extra resistance of 4 lbs. per foot was indicated; a similar result was indicated for every additional carriage to the number of six, the air acting upon the forward end of each in the same ratio. Having thus satisfactorily ascertained that the atmospheric resistance increased in exact proportion to the number of carriages, as well as according to the speed of the train, the author proceeded to test a plan which he had devised for partially overcoming this resistance. For this purpose he placed hoods over the ends of the carriages to enclose the vacant space between the buffers; and thus formed, in appearance, one continuous carriage. At the adjustment of each several hood, a decrease of 4 lbs. per foot of surface thus enclosed was indicated; and when all the hoods were applied, the atmospheric resistance had diminished to 10 lbs., or that only of the first carriage. He next attempted to reduce the remaining resistance of 10 lbs.—

"With this view two more carriages were constructed, the ends of which were of a wedge form, like the bow of a ship, that is, the floor and roof of the carriage were pointed like the bow, while the sides of the carriage were left perpendicular, thus forming a sort of equilateral triangle, with its base attached to the parallel sides of the carriage."

These carriages were intended to be placed one at either end of the train, but after one only had been tried as a front carriage, and a reduction of pressure from 10 lbs. to 6.3 lbs. was obtained, our author, like a prior and more noted experimenter on the economizing of locomotive power, was disappointed in the complete realization of his hopes, by his model of growing perfection ceasing to exist;—in one case hunger, in the other centrifugal force, worked the decree of fate, and dispelled the vision of the sanguine expectants.

Appended to this paper, which is illustrated by engravings, is a description of a plan for giving the wheels of railway carriages an independent motion, whereby it is presumed that the tendency which the iron, forming the axle, has to lose its fibre, and become crystallized, will be destroyed. This independent motion is proposed to be given by dividing the axle into two parts, and reconnecting the parts by a peculiar construction of coupling-box; whereby they will be allowed to revolve freely and independently of each other. Something very like this is described at page 420 of our present number; and no doubt such a freedom for the wheels is very desirable to facilitate the traversing of curves, as well as for checking the tendency of the axle to crystallize (if such is its effect); but we think these desired results might be obtained by merely leaving one wheel loose on its axle.

REPORT OF AMERICAN. PATENTS.

From the "Journal of the Franklin Institute."

BY MR. C. M. KELLER.

To Francis Duplessis, *of Plaquemines, Louisiana, for an improvement in the apparatus for the manufacture of sugar.*

The patentee claims the arrangement of a series of kettles for evaporating saccharine juices and syrups in the manufacture of sugar, let into the top of a steam-boiler, when any method is employed for regulating the temperature of the kettles—that is, reducing or increasing the temperature of a portion of the series without affecting the rest.

He also claims arranging the series of evaporating-kettles, let into the top of a steam-boiler (for the purpose of exposing them directly to the action of steam within the boiler), in combination with the arrangement for heating the pans, for preparing the saccharine juice, by means of steam conducted from the boiler into the double bottoms of such pans.

And he likewise claims dividing the boiler into two or more compartments by a partition or partitions, provided with a valve, in combination with the arrangement of kettles let into the boiler, for the purpose of regulating the temperature.

To ANDREW HOOD, *of New York, for an improvement in gates for fences, &c.*

THE patentee says:—"The principle of my invention consists in hanging a swinging gate on a central axis when combined with a fence arranged around it, with a carriage or other way on opposite sides, so that the gate closes against either side of these gate-ways, the gate-ways being open on each side for the admission of carriages, horses, &c., within the fence; and also in providing the gate with projecting handles, for operating two latches or bolts which fasten it, so that the rider, in passing along, can reach the handle and turn the gate against the other side of the carriage-way, without the necessity of dismounting, as is the case in the present mode of construction."

Claim:—"I do not claim, as my invention, hanging a gate on a central axis, so as to open in either direction, and close without a return movement, as this has long since being effected; but I claim a gate hung and turning on a central axis in combination with the fence arranged around the axis of the gate, and provided with two carriage or other ways on opposite sides, as above described."

Scientific Adjudication.

PRIVY COUNCIL CHAMBER.

London, June 21st, 1847.

Coram—Lords Brougham, Campbell, Langdale, & other Lords.

THIS was an application under the fourth section 5 and 6 Wm. IV., c. 83, for the extension of certain letters patent, granted to Mr. James Smith, of Deanston, for "certain improvements in machinery used in the preparing and spinning of cotton, flax, wool, and other fibrous substances;" and certain other letters patent, granted to John Robertson, of Crofthead, for "certain improvements in the mule, jenny, or other machines for spinning of cotton, and in the billy, stretching frame, or other machine for roving of cotton, and in the machinery for spinning and roving of silk, wool, flax, hemp, or other fibrous substances;"—the latter dated 21st September, 1833, and the former 20th February, 1834.*

Sir Fitzroy Kelly, Q.C., and Mr. Webster appeared in support of the petition.

* For description of Smith's invention, see Vol. V., p. 193, Conjoined Series; and for report of Robertson's invention, see Vol. XVI., p. 71, Conjoined Series.

The application was opposed by Mr. Joseph Clarke, of Manchester, cotton spinner, for whom Mr. M. D. Hill, Q.C., and Mr. Montague Smith appeared.

In opening the case for the petitioners, Mr. Webster stated to their Lordships, that the two inventions had been constantly worked in combination, and that little if anything had been done under the former patent alone;—that the feature of improvement in the invention of Mr. Robertson was a stripping-off motion, and that the invention of Mr. James Smith rested principally in the introduction and use of a mangle-wheel or rack, which caused spinning machines to work with greater ease and freedom, with less concussion and shock to the carriage of the mule as it came up to the rollers,—and embraced some other advantages, which he pointed out, and characterised the invention as a great improvement.

Mr. Webster also stated that Mr. James Smith's attention had been bestowed upon one of the inventions as early as the year 1820, although the patent was not taken until 1834, fourteen years afterwards.

Lord Brougham enquired what amount of profits the patentees had realized; and Mr. Webster, in reply, was understood to state £32,839, from which expenses in introducing the invention, amounting to about £15,000, and losses amounting to £4830, would have to be deducted, leaving about £12,000 as the balance.

Sir Fitzroy Kelly reminded their Lordships that this was the entire profit, in respect of both the inventions; and Mr. Webster proceeded by pronouncing it an extremely small remuneration, adding that a very long time had expired after the date of the patents before the inventors had been able to introduce them; that the patentees had had to employ numerous agents, thereby incurring very considerable cost; and that machine-makers were extremely slow to adopt any improvements or alterations until they were satisfied of their entire worth and success.

Mr. William Carpmael was examined in support of the petition, and stated his opinion of the excellence and value of the inventions, and their superiority over other self-acting mules; that he had seen a machine in Manchester, the first year after the patent, and next saw it seven years ago at Deanston. On cross-examination by Mr. Hill, he admitted the machines he had seen had the driving-band in use, whereas the drawing attached to the specification shewed a side shaft, but no such driving-band, and that, in his judgment, the better way was to use the strap. He also mentioned Roberts' self-acting mule, and the circumstance of its being extended on application.

Mr. Joseph Whitworth, of Manchester, stated, that he agreed with Mr. Carpmael, and that Mr. Smith exhibited the machine at his (Mr. Whitworth's) premises, in 1835; that it was not then in use in England, but was in Scotland; that he assisted Mr. Smith in making them in 1835, and that a machine was set to

work for exhibition at his premises, and was seen by numbers of persons in the trade.

After examining the plan, he stated that the general features of the one so exhibited were the same, but that the machine had a driving band, and not a side shaft.

Peter Mc Gregor was called to prove at what time he made the machines in Scotland, and to describe the difficulties which Mr. Smith had encountered; he moreover stated he recollected receiving an order towards the close of 1837, and it being supplied to a house at Kilburnie, in Scotland.

On cross examination, it appeared that Mr. Smith had several other patents for other inventions.

Mr. Henry Houldsworth, of Manchester, cotton spinner, stated that he had had an early knowledge of the experiments made by Mr. Smith, and of the difficulties with which Mr. Smith had had to contend. Mr. Houldsworth passed a high encomium upon the invention, but, upon cross examination, admitted he had none of the mules in his mill at Manchester, or elsewhere.

Mr. Cottam, the agent for the patentees at Manchester, was called to speak to the receipt of monies and various expenses, and stated that he had been engaged for the patentees at £150 a year for part of the term, and £200 per annum for a later period.

A general account and statement was then handed in by Sir Fitzroy Kelly on behalf of the petitioners, and, after examination of it by their Lordships, Lord Brougham enquired whether it did not shew on the face of it a clear profit of about £27,000, which was admitted by the petitioners' counsel.

Lord Brougham, in delivering judgment, observed that these applications were not to be considered as matters of course, and that their Lordships had decided to refuse the application.

Whitehouse's application for extension, and one or two other cases, were mentioned during the hearing.

Messrs. Tatham, Upton, and Co., Solicitors for the petitioners; Mr. Harrison Blair, Solicitor for the opposer.

PROTECTION OF PATENTS IN THE UNITED STATES OF AMERICA.

In a former number of our Journal, Vol. XXV., p. 41, we gave some account of an action, brought by Mr. Henry Stephens, of Stamford-street, against Messrs. David and Willam Felt, of New York, for an invasion of his American patent, for manufacturing blue writing fluid or ink; whereby the plaintiff obtained a verdict for 2000 dollars damages.

It seems a Bill of Exceptions was afterwards obtained by the defendants, with a view of procuring a new trial, which has been, after numerous law proceedings and a delay of two years and a

half, finally decided in favor of the plaintiff,—the former verdict being confirmed.

The following brief sketch of the proceedings in the United States Circuit Court, to the final hearing of the case, will give our readers some idea of the law's delay amongst our transatlantic brethren:—

1st. There was a suit in equity, and a bill filed November 7th, 1842; this was in progress until November, 1843. On the 23rd February, 1843, notice was served of a motion for an injunction, which was granted the 6th of March, 1843, until a decision of law could be obtained. A suit at law was commenced March 16th, 1843, which, after numerous delays, was tried May, 1844. This trial lasted six or seven days, and eventually a verdict for the plaintiff was rendered for 2000 dollars.

A Bill of Exceptions was then prepared by the counsel for the defendants, which was not brought to argument until October, 1845, and not decided until April, 1846, when a new trial was refused. In the July term following, an application for a re-argument by the defendant was granted, which re-argument was heard on the 9th of December, 1846, when the previous judgment in favor of the plaintiff was confirmed. A period of four years and one month was therefore consumed in getting to this decision.

LIST OF REGISTRATIONS EFFECTED UNDER THE ACT FOR PROTECTING NEW AND ORIGINAL DESIGNS FOR ARTICLES OF UTILITY.

1847.

May 29. *William Graham*, of 9, Bride-lane, Fleet-street, for a cover of an inkstand.

June 1. *Samuel Smith*, of 25, London-road, Derby, lamp-maker, for a carriage roof-lamp.

2. *Barritt & Co.*, of 173, Fleet-street, for a pencil-case.

3. *Samuel Messenger*, of Birmingham, for a tricolored policeman's signal lamp.

3. *Charles Ricketts*, of 5, Agar-street, West Strand, London, for the despatch gas cooking apparatus.

5. *Joseph Arnold*, of 24, Upper Marylebone-street, London, for a music stool.

5. *Isaac Brampton, sen., & Isaac Brampton, jun.*, of Leicester, glove manufacturers, for a looped fabric glove.

5. *Jeremiah Smith*, of 42, Rathbone-place, for an envelope.

7. *Robert Blundell*, of 13, Theberton-street, Islington, land-surveyor, for an improved drainage-level.

7. *Edward Varney Pledge*, of 311, Cheapside, Birmingham, for an agate whip-handle.

June 9. *Thomas Glover*, of 47, Myddleton-square, Clerkenwell, for an apparatus to cover over the joint of a gas-meter pipe, in order to prevent fraud in the use of gas-meters.

9. *John F. Shaw*, of Albion-street, Cheltenham, for a saddle-apron.

10. *Simcox, Pemberton, & Sons*, of Birmingham, for an improved stair-rod.

11. *Isaac Laslett*, of Farnborough, Kent, for a brick and tile machine.

12. *W. H. Bentley*, of Bedford, ironmonger, for the universal boiler or kettle.

15. *Alexander Wright*, of 58, Holywell-street, Millbank, for apparatus for testing the quantity of proof spirits in mixtures of alcohol and water, and more particularly when mixed with saccharine matters.

15. *Henry Badger*, of West Bromwich, for an improved glass window-blind for the lower part of windows.

17. *Frederick Richard Louis Koepp*, of 14, Chadwell-street, Middlesex, for a carriage telegraph.

18. *Herbert Room*, of Birmingham, for a portable pillar shower-bath.

19. *John & Charles Ratcliff*, of 140, Suffolk-street, Birmingham, lamp and gas-fitting manufacturers, for a gas-consumer.

19. *John Coope Haddan*, of 14, Lincoln's-Inn-fields, London, for a spring stock.

19. *R. Fawcitt*, of Skutterskelfe, near Stokesley, for a draining plough.

24. *E. Looms*, of Whittlesea, Cambridgeshire, and *W. P. Stanley*, of Peterborough, Northamptonshire, for an improved hand seed-dibble for depositing wheat, beans, and such other seeds as are or may be dibbled.

25. *James Cocks*, of 18, Allen-street, Lambeth, Surrey, for a day and night signal.

25. *Henry Greaves*, of Birmingham, for a treble lock-frame for carpet and other bags.

26. *James Furrell*, of Vicarage-place, Kensington, for a file for filing papers.

26. *John Paltrineri*, of 4, South-street, Finsbury, for a binding-needle.

28. *Henry & John Gardner*, of 453, Strand, lamp manufacturers, for a candle-shade-holder support.

28. *John Cornes*, of Barbridge, near Nantwich, Cheshire, for an improved chaff engine.

28. *George Oxley*, of 19, Old Nicholl-street, Church-street, Bethnal-green, for an ottoman music-stool.

List of Patents

That have passed the Great Seal of IRELAND, from the 17th April to the 17th June, 1847, inclusive.

To Henry Franklin, of Marstone Mortaine, in the county of Bedford, brick-maker, for improvements in the manufacture of bricks, tiles, and other like articles.—Sealed 25th May.

George Augustus Huddart, of Brynkir, in the county of Caernarvon, Esq., for certain improved apparatus for the cultivation of land.—Sealed 25th May.

John Lowe, of Manchester, in the county of Lancaster, civil engineer, and James Simpson, of the same place, joiner, for certain improvements applicable to carriages to be used upon railways, part of which improvements may also be used upon other roads.—Sealed 25th May.

François Stanilas Meldon De Sussex, of Millwall, in the county of Middlesex, manufacturing chemist, for improvements in smelting copper and other ore.—Sealed 2nd June.

Andrew Crosse, of Broomfield, in the county of Somerset, Esq., for improvements in treating fermentable and other liquids, so as to cause impurities or matters to be extracted or precipitated.—Sealed 2nd June.

Thomas Du Boulay, of Sandgate, in the county of Kent, Esq., and John Du Boulay, of Buckshaw, in the county of Dorset, Esq., for improvements in fitting up granaries and warehouses, and of getting into condition and preserving therein grain, pulse, seeds, malt, and other perishable articles.—Sealed 2nd June.

Lionel Campbell Goldsmid, of Rue Mogador, Paris, Esq., for improvements in applying rudders to ships and other vessels,—being a foreign communication.—Sealed 2nd June.

John Watson, of Glasgow, manager to Messrs. Gilmore & Kerr, power loom cloth manufacturers, for improvements in weaving by Jacquard looms, by power.—Sealed 2nd June.

William Henry Hatcher, of 345, Strand, in the county of Middlesex, civil engineer, for improvements in electric telegraphs, and in apparatus connected therewith; and also in electric clocks and time-keepers.—Sealed 2nd June.

Patrick Moir Crane, of Yniscedwyn Iron Works, near Swansea, for improvements in the manufacture of iron.—Sealed 2nd June.

George Lowe, of Finsbury Circus, in the county of Middlesex, civil engineer, for improvements in the manufacture of and in burning gas, and in the manufacture of fuel.—Sealed 2nd June.

George Fergusson Wilson, of Belmont, Vauxhall, in the county of Surrey, Gent., for improvements in the production of light, and in the manufacture or preparation of materials applicable thereto.—Sealed 4th June.

Maximilian François Joseph Delfosse, of Regent-street, in the county of Middlesex, Esq., for improvements in preventing and removing incrustations in steam boilers.—Sealed 5th June.

Jean Marie Fourmentin, of New Bridge-street, Blackfriars, Gent., for improvements in the manufacture of carbonate of lead.—Sealed 10th June.

List of Patents

Granted for SCOTLAND, subsequent to 22nd May, 1847.

To Reginald James Blewitt, of Llantarnam Abbey, Newport, in the county of Monmouth, Esq., for improvements in the manufacture of malleable iron.—Sealed 24th May.

Solomon Leatham, of Leeds, in the county of York, overlooker, for improvements in roving and spinning flax and other fibres.—Sealed 24th May.

Christian Schiele, of Frankfort-on-the-Maine, but now of Manchester, in the county of Lancaster, mechanician, for certain improvements in machinery or apparatus for condensing steam, which said improvements are also applicable to other similar purposes.—Sealed 28th May.

Jean Marie Fourmentin, of New Bridge-street, Blackfriars, Gent., for improvements in the manufacture of carbonate of lead.—Sealed 28th May.

Thomas Bartlett Simpson, of Threadneedle-street, in the city of London, Gent., for certain improvements in propelling, and in machinery employed therein.—Sealed 2nd June.

Edward Morewood, of Thornbridge, in the county of Derby, merchant, and George Rogers, of Stearndale, in the same

county, Gent., for improvements in the manufacture of iron into sheets, plates, or other forms, in coating iron, and in preparing iron for coating and other purposes.—Sealed 7th June.

George Augustus Huddart, of Brynkir, in the county of Caernarvon, Esq., for certain improved apparatus for the cultivation of land.—Sealed 7th June.

John Hill, of Hulme, near Manchester, in the county of Lancaster, machine-maker, for improvements in looms for weaving certain kinds of cloth.—Sealed 9th June.

Francis Bowes Stevens, of Hoboken, in the county of Hudson, in the State of New Jersey, in the United States of America, engineer, for improvements in applying means and apparatus to ships and vessels to improve their speed,—being a foreign communication.—Sealed 9th June.

Elijah Galloway, of Buckingham-street, Strand, in the county of Middlesex, civil engineer, for improvements in rotatory engines, and in locomotive carriages, railways, and wheels for carriages.—Sealed 11th June.

John Lane, of Oriel-street, Liverpool, brewer, for improvements in railway-carriages and engines.—Sealed 11th June.

Alfred Vincent Newton, of the Office for Patents, 66, Chancery-lane, in the county of Middlesex, mechanical draughtsman, for an improved apparatus to be applied to steam-boilers,—being a foreign communication.—Sealed 11th June.

John Healey, of Bolton, in the county of Lancaster, machine-maker, for a new and improved woven fabric, and also certain improvements in machinery for producing the same.—Sealed 15th June.

Charles Larrad, of Leicester, mechanist, for improvements in machinery for cutting wood for the manufacture of bobbins and other articles.—Sealed 15th June.

Thomas Russell Crampton, of the Adelphi, in the county of Middlesex, engineer, for improvements in locomotive engines.—Sealed 15th June.

Alfred Brett, of Holborn Bars, and George Little, of High Holborn, electrical engineer, for improvements in electric telegraphs, and in arrangements and apparatus to be used therein and therewith, part of which improvements are also applicable to time-keepers and other useful purposes.—Sealed 15th June.

Pierre Frederic Gougy, of Leicester-square, in the county of

Middlesex, Gent., for improvements in apparatus and machinery for raising, lifting, and otherwise moving heavy bodies.—Sealed 16th June.

Samuel Kenrick, of Handsworth, in the county of Stafford, iron-founder, for certain improvements in preparing or forming moulds for casting metal.—Sealed 18th June.

George Taylor, of Holbeck, near Leeds, in the county of York, mechanic, for improvements in the construction of engines and carriages to be used on railways.—Sealed 18th June.

Frederic Theodore Philippi, of Bellfield Hall, in the county of Lancaster, calico printer, for certain improvements in machinery or apparatus for stretching and finishing woven fabrics.—Sealed 18th June.

Francis Preston, of Ardwick, near Manchester, spindle-maker, for certain improvements in machinery or apparatus to be used in the preparation of cotton and other fibrous substances for spinning.—Sealed 21st June.

New Patents

SEALED IN ENGLAND.

1847.

To Richard Archibald Brooman, of Fleet-street, patent agent, for certain improvements in the processes and machinery employed in scouring and bleaching. Sealed 29th May—6 months for inrolment.

Alfred Stevens, of Queen's-terrace, St. John's-wood, Middlesex, chemist, for a new or improved preparation or preparations of certain substances for making various glutinous compounds. Sealed 29th May—6 months for inrolment.

Francis Bernard Bekaert, of Rue Royale Exterieure, Brussels, in the kingdom of Belgium, for a method of increasing the quantity of cream procured from milk, and preserving milk; being a communication. Sealed 29th May—6 months for inrolment.

William Horne, of Long-acre, Middlesex, coach maker; George Beadon, of Battersea-fields, Surrey, Commander in Her Majesty's Navy; and Andrew Smith, of Millwall, Middlesex, engineer, for improvements in wheel carriages. Sealed 3rd June—6 months for inrolment.

Josiah George Jennings, of Great Charlotte-street, Blackfriars-road, Surrey, plumber and builder, for improvements in water-closets, and in making joints and connections of pipes. Sealed 3rd June—6 months for inrolment.

Christopher Nickels, of York-road, Surrey, Gent., for improvements in the manufacture of woven fabrics, and in giving elasticity to certain articles or fabrics. Sealed 3rd June—6 months for inrolment.

John Hill, of Hulme, near Manchester, machine maker, for improvements in looms for weaving certain kinds of cloth. Sealed 3rd June—6 month for inrolment.

Thomas Woodbridge, of 10, Osborn-street, Whitechapel, corn-dealer, for a certain improvement or certain improvements in steam engines. Sealed 3rd June—6 months for inrolment.

Samuel Benjamin Edward Berger, of Abchurch-lane, in the city of London, merchant, for certain improvements in the construction of railway carriages,—being a communication. Sealed 3rd June—6 months for inrolment.

George Taylor, of Holbeck, near Leeds, mechanic, for improvements in the construction of engines and carriages to be used on railways. Sealed 3rd June—6 months for inrolment.

Richard Clark, of 447, West Strand, lamp manufacturer, for certain improvements in the production of artificial light, and in burners, lamps, and candlesticks. Sealed 7th June—6 months for inrolment.

Samuel Ellen, of Grange-road, Bermondsey, Gent., for improvements in the manufacture of losh hide leather, and other oiled leathers. Sealed 8th June—6 months for inrolment.

Charles Larrad, of Leicester, machinist, for improvements in machinery for cutting wood for the manufacture of bobbins and other articles. Sealed 8th June—6 months for inrolment.

Bondy Azulay, of Rotherhithe, Surrey, printer, and Abraham Solomons, of the City of London, merchant, for certain improvements in the manufacture of charcoal and other fuel. Sealed 10th June—6 months for inrolment.

William Darling, of Glasgow, ironmonger, for improvements in moulding, and in the manufacture of certain articles of cast-iron. Sealed 10th June—6 months for inrolment.

Henry Cox, of 2, Chapel-place, Battersea-fields, Surrey, for improvements in the preserving and preparing of wood, bricks, tiles, and other substances. Sealed 10th June—6 months for inrolment.

William Beckett Johnson, of Manchester, engineer, for certain improvements in the construction of locomotive engines to be used upon rail or other ways, which improvements are also applicable to carriages used upon railways. Sealed 12th June —6 months for inrolment.

James Johnson, of Bradley, in the parish of Bilston, in the county of Stafford, iron founder and boiler maker, for improvements in machinery for the manufacture of rivets, railway or other pins, bolts, nuts, and spikes. Sealed 12th June—6 months for inrolment.

John Mercer, of Oakenshaw, and John Greenwood, of Church, both in the county of Lancaster, chemists, for improvements in certain substances applicable to the manufacture, scouring, and washing wool and woollen fabrics, and other substances. Sealed 12th June—6 months for inrolment.

George Edmund Donisthorpe, of Leeds, in the county of York, manufacturer, for improvements in roving and spinning wool and flax, and in treating wool previous to spinning, and in heckling flax. Sealed 12th June—6 months for inrolment.

Joseph Wilcock, of Barnsley, in the county of York, Gent., for certain improvements in the ventilation of mines. Sealed 12th June—6 months for inrolment.

James Richards, of New York, in the United States of America, engineer, for improvements in constructing pistons. Sealed 12th June—6 months for inrolment.

Francis Bowes Stevens, of Hoboken, in the county of Hudson, in the State of New Jersey, in the United States of America, engineer, for improvements in applying means and apparatus to ships and vessels to improve their speed,—being a communication. Sealed 12th June—6 months for inrolment.

Richard Roberts, of Manchester, in the county of Lancashire, engineer, for improvements in machinery for preparing and spinning cotton and other fibrous substances. Sealed 15th June—6 months for inrolment.

John Lane, of Oriel-street, Liverpool, brewer, for improvements in railway carriages and engines. Sealed 15th June—6 months for inrolment.

James Timmins Chance, of Handsworth, in the county of Stafford, glass manufacturer, for improvements in the manufacture of glass,—being a communication. Sealed 15th June—6 months for inrolment.

John Lane Higgins, of Oxford-street, in the county of Middlesex, Esq., for improvements in the construction of winches and windlasses. Sealed 15th June—6 months for inrolment.

Alexander Symons, of London-street, Fenchurch-street, merchant, for improvements in railway-carriages, in preventing accidents on railways, and in ascertaining the speed of carriages,—being a communication. Sealed 15th June—6 months for inrolment.

Frederick Theodore Philippi, of Bellfield Hall, in the county of Lancaster, calico printer, for certain improvements in machinery or apparatus for stretching, drying, and finishing woven fabrics. Sealed 15th June—6 months for inrolment.

James Houghton, of Oldham, in the county of Lancaster, engineer, for certain improvements in machinery or apparatus to be used in the preparation and spinning of cotton, wool, and other fibrous substances. Sealed 15th June—6 months for inrolment.

Henry Pooley, of Liverpool, iron-founder, for certain improvements in weighing-machines. Sealed 16th June—6 months for inrolment.

James Hill, of Stayley Bridge, in the county of Chester, cotton-spinner, for improvements in or applicable to certain machines for preparing, spinning, and doubling cotton, wool, and other fibrous substances. Sealed 19th June—6 months for inrolment.

Samuel Keeling, of Hanley, in the county of Stafford, manufacturer of earthenware, for an improved method of making candlesticks. Sealed 19th June—6 months for inrolment.

James Murdoch, of Staple Inn, patent agent, for an improved mode of manufacturing woven goods, figured on both sides,—being a communication. Sealed 19th June—6 months for inrolment.

François Henri Bickés, of Mayence, on the Rhine, Gent., and Meyer Henry, of Colonial Chambers, Crutched Friars, in the city of London, merchant, for certain improvements in treating, manuring, or preparing corn, seeds, plants, and trees; and in fertilizing land. Sealed 19th June—6 months for inrolment.

William Vickers, of Sheffield, steel manufacturer, for improvements in the manufacture of iron. Sealed 19th June—6 months for inrolment.

Thomas Russell Crampton, of Adam-street, Adelphi, for improvements in locomotive engines. Sealed 19th June—6 months for inrolment.

James Robertson, of Great Howard-street, Liverpool, for improvements in the manufacture of casks and other wooden vessels; and in machinery for cutting wood for that and other purposes. Sealed 19th June—6 months for inrolment.

John Obadiah Newell Rutter, of Brighton, gas engineer, for certain improved methods of, or apparatus for, conveying intelligence. Sealed 22nd June—6 months for inrolment.

John Macintosh, of Bedford-square, Middlesex, for improvements in engines to be worked by steam or other suitable fluid; and improvements in propelling carriages and vessels. Sealed 22nd June—6 months for inrolment.

James Soutter and William Frederick Hammond, of the Spread Eagle Works, Limehouse, engineers, for certain improvements in the steam-engine, and in machinery for propelling. Sealed 22nd June—6 months for inrolment.

Henry Mapple, William Brown, and James Lodge Mapple, of Child's Hill, Hendon, Middlesex, for improvements in communicating intelligence, by means of electricity, and in apparatus relating thereto; part of which improvements are also applicable to other like purposes. Sealed 23rd June—6 months for inrolment.

John Richard Watson, of Pentonville, Middlesex, for an instrument for registering angles at sea. Sealed 24th June—6 months for inrolment.

Robert Wilson, of Low Moor Iron Works, Bradford, in the county of York, engineer, for improvements in machinery, and the arrangements thereof, for forging, stamping, punching, cutting, and pressing metals and other substances. Sealed 26th June —6 months for inrolment.

Ureli Corelli Hill, of New York, United States of America, professor of music, for a mode or modes of producing musical sounds. Sealed 28th June—6 months for inrolment.

William Edward Newton, of the Office for Patents, 66, Chancery-lane, civil engineer, for certain improvements in manufacturing wheels,—being a communication. Sealed 28th June—6 months for inrolment.

Henry Hornblower, of Dalgleish-place, Commercial-road, for certain improvements in obtaining motive power. Sealed 28th June—6 months for inrolment.

CELESTIAL PHENOMENA for July, 1847.

D.	H.	M.	
1			Clock before the ⊙ 3m. 22s.
			☽ rises 9h. 55m. A.
			☽ passes mer. 2h. 18m. M.
			☽ sets 7h. 23m. M.
2	13		☽ in Perigee
2	21	23	♄ in conj. with the ☽ diff. of dec. 4. 45. S.
	23	22	♂ □ with the ⊙
3	22	39	⊙ in Apogee
4	21	48	♂ in conj. with the ☽ diff. of dec. 3. 6. S.
5			Clock before the ⊙ 4m. 6s.
	—		☽ rises 11h. 50m. A.
	—		☽ passes mer. 5h. 49m. M.
	—		☽ sets 0h. 30m. A.
	6	18	♅ in conj. with the ☽ diff. of dec. 0. 21. S.
	8	42	☽ in □ or last quarter
7	9	15	Vesta □ with the ⊙
8	12	25	☿ in the descending node
	—		Occul. 63 Tauri, im. 13h. 41m. em. 14h. 30m.
9	16	16	Juno oppo. to the ⊙ intens. of light 0·584
10			Clock before the ⊙ 4m. 55s.
	—		☽ rises 2h. 24m. M.
	—		☽ passes mer. 10h. 17m. M.
	—		☽ sets 6h. 12m. A.
	16	32	♅ in □ with the ⊙
	18	7	☿ greatest elong. 26. 29. E.
	18	21	♃ in conj. with the ☽ diff. of dec. 4. 46. N.
12	11	38	Ecliptic conj. or ● new moon
13	6	45	♂ in conj. with ♅ diff. of dec. 2. 22. S.
	19	20	Ceres in conj. with the ⊙
14	7	21	☿ in conj. with the ☽ diff. of dec. 3. 5. N.
16	—		Mer. R.A. 9h. 23m. dec. 13. 41. N.
	—		Venus R. A. 10h. 41m. dec. 8. 53. N.
	—		Mars R. A. 1h. 14m. dec. 4. 46. N.
	—		Vesta R. A. 13h. 16m. [illegible] 2. S.
	—		Juno R. A. 19h. 0m. de[illegible] 4. S.
	—		Pallas R. A. 6h. [illegible] 14. S.
	—		Ceres R. A. 7h. [illegible] 32. N.
	—		Jupiter R. A. 6h. 10m. dec. 2[illegible] 13. N.
	—		Saturn R. A. 22h. [illegible] 38. S.
	—		Georg. R. A. 1h. 8m. dec. [illegible] 33. N.
	—		Mercury passes mer. 1h. [illegible]
	—		Venus passes mer. 3h. 7m.
	—		Mars passes mer. 17h. [illegible]
	—		Jupiter passes mer. 22h. [illegible]
	—		Saturn passes mer. 15h. 21m.
	—		Georg. passes mer. 17h. [illegible]
	1	32	♀ in conj. with the ☽ diff. of [illegible] 3. 37. N.
17	22		☽ in Apogee
18	5	12	♂ in Perihelion
	16	0	☿ in Aphelion
20			Clock before the sun 5m. [illegible]
	—		☽ rises 0h. 41m. A.
	—		☽ passes mer. 6h. 1m. A.
	—		☽ sets 11h 15m. A.
		52	☽ in □ or first quarter
22			Pallas greatest hel. lat. N.
	21	6	♀ in the descending node
23	22	2	☿ stationary
24	6	40	♅ stationary
25			Clock before the ⊙ 6m. 11s.
	—		☽ rises 5h. 45m. A.
	—		☽ passes mer. 10h. 13m. A.
	—		☽ sets 1h. 45m. M.
	4		Pallas in conj. with ♃ diff. of dec. 24. 17. S.
	6	40	♀ greatest elong. 45. 40. E.
27	10	8	Ecliptic oppo. or ○ full moon
29	21		☽ in Perigee

J. LEWTHWAITE, Rotherhithe.

Knowles's & Woodcock's lifting mach^y

Fig. 2.

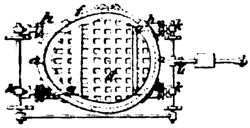


Fig. 1.

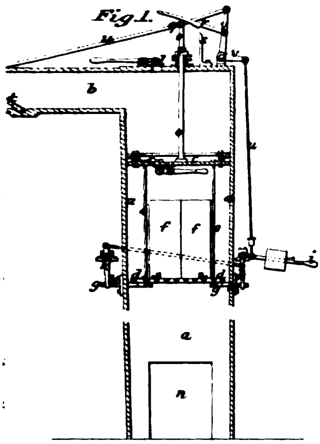


Fig. 3.

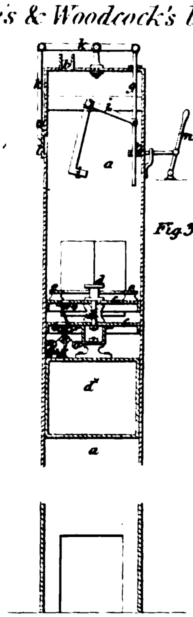
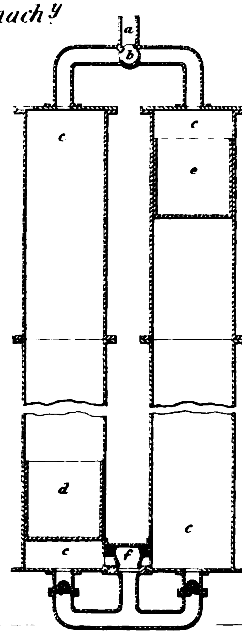


Fig. 4.



Defries' imp^d dry gas meter.

Fig^s 3, 4, 5. Fig^s 7, 8, 9.

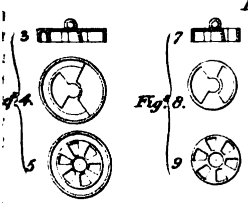


Fig. 6.

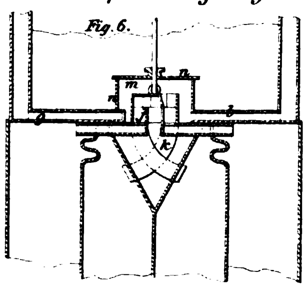


Fig. 2.

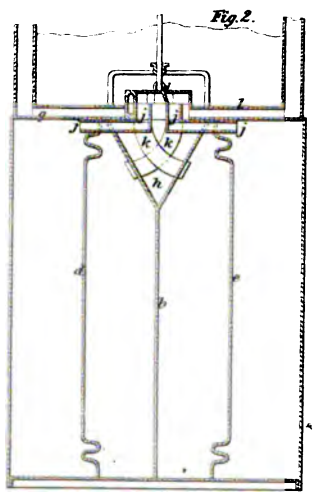
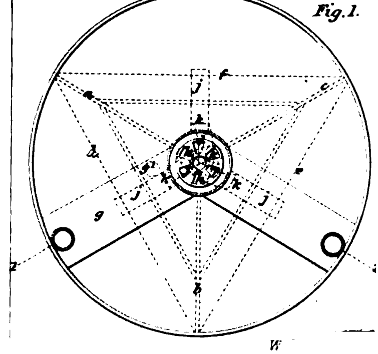


Fig. 1.



Newton's imp^ts in grinding grain

Fig. 1.

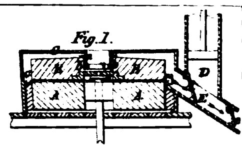


Fig. 2.

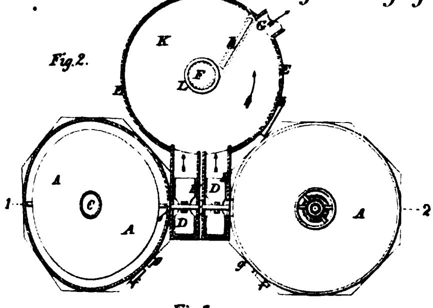
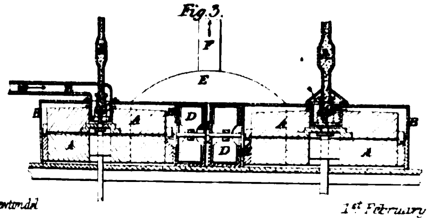
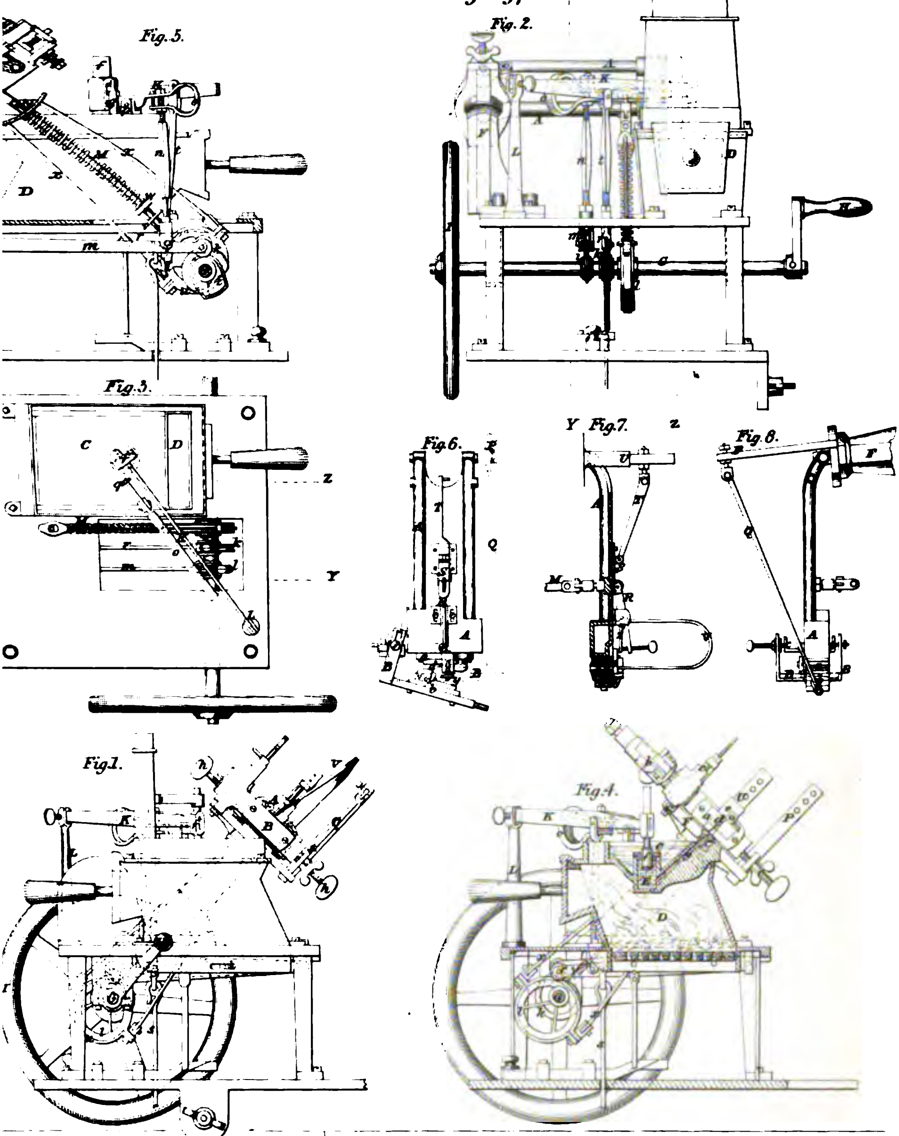


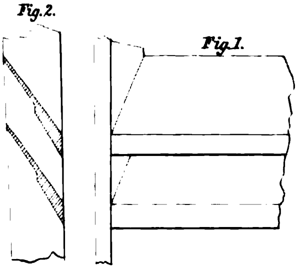
Fig. 3.



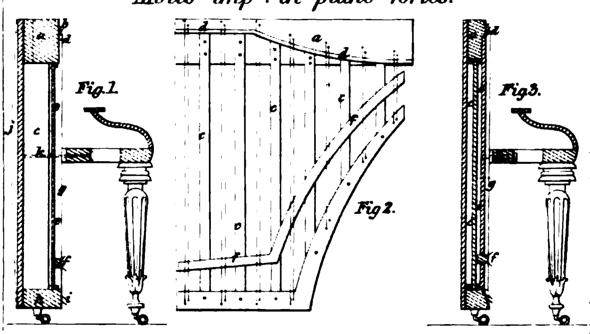
Newton's mach^y. for casting type.

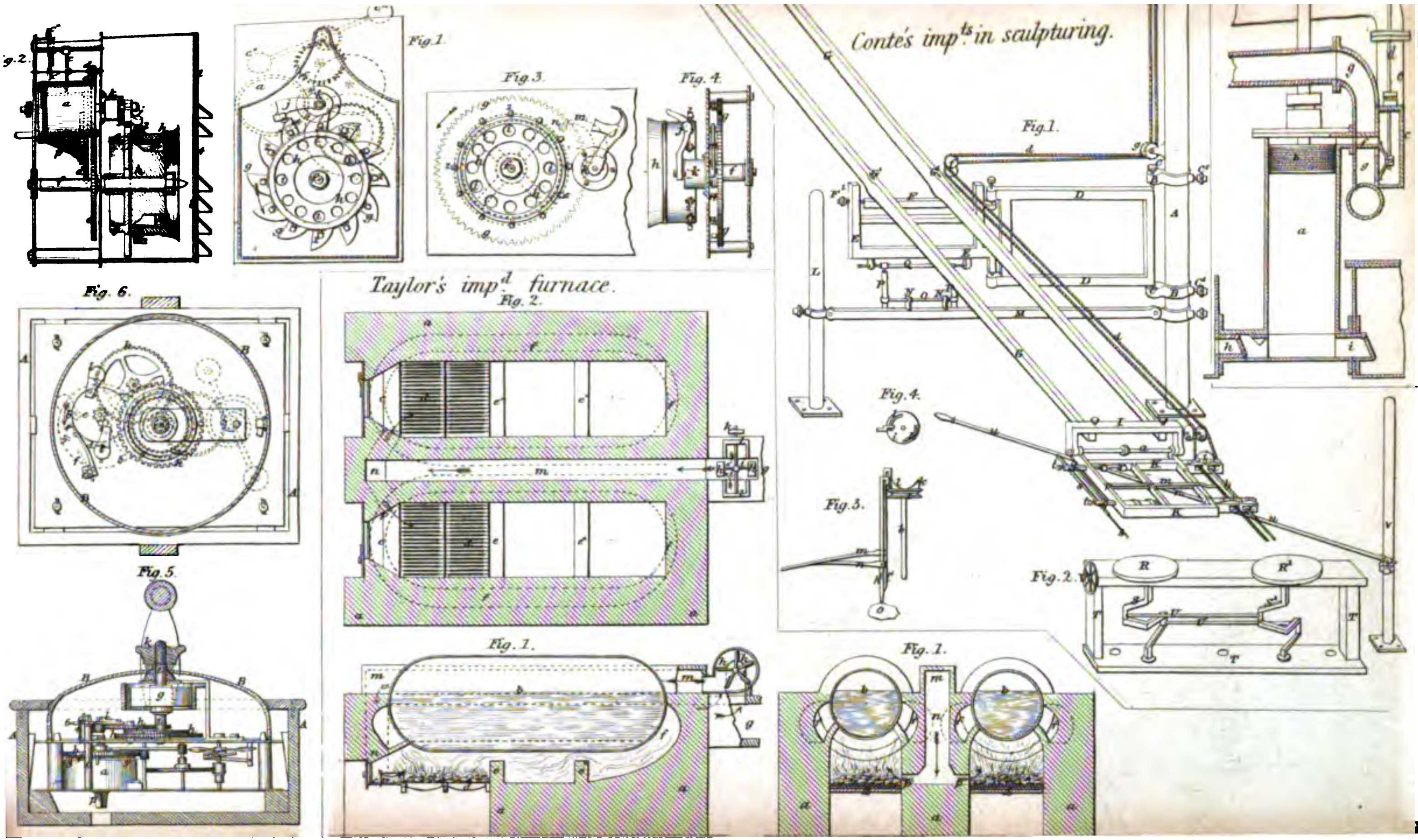


Marvin & Moore's grating.



Motts' imp^ts. in piano-fortes.




Conte's impts. in sculpturing.
Taylor's impd. furnace.
Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.
Fig. 5.
Fig. 6.

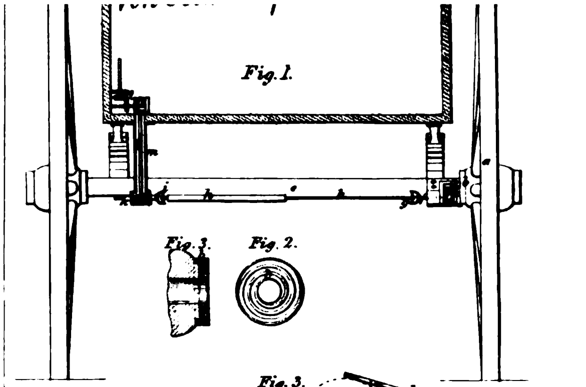
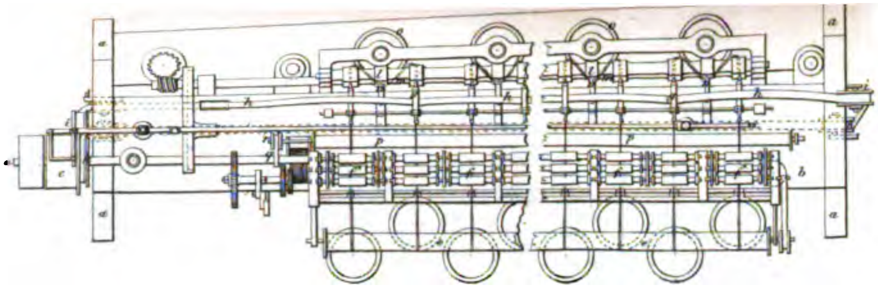


Fig. 1.

Fig. 3.

Fig. 2.



Kershaw's mach.y for preparing cotton.

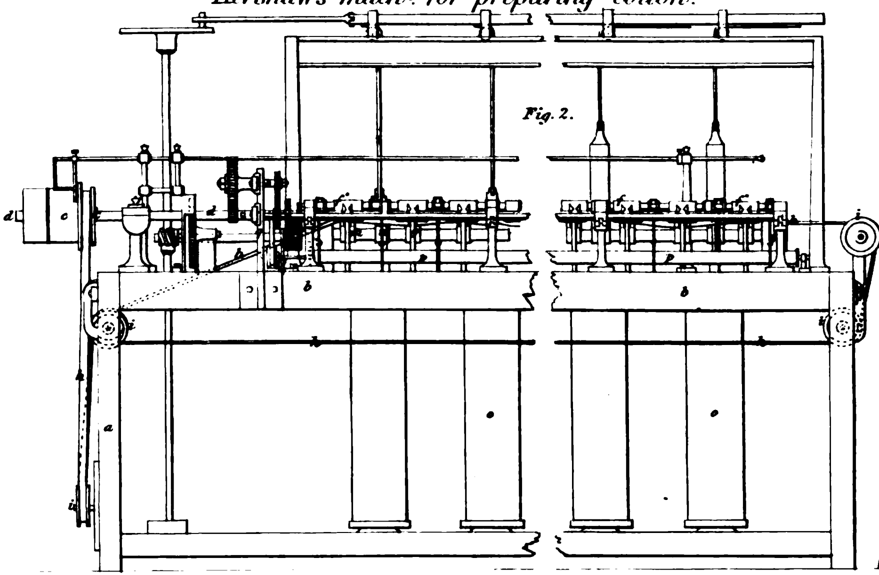


Fig. 2.

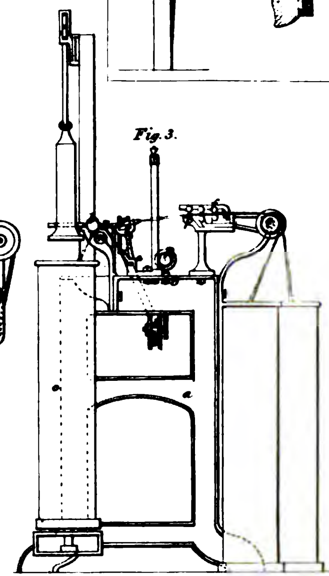


Fig. 3.

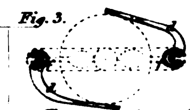


Fig. 3.

Jones' imp.d flyer.

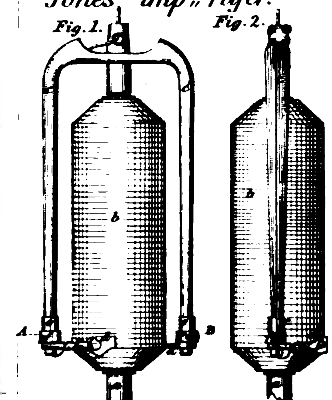


Fig. 1.

Fig. 2.

PLATE V.

Knight's imp.ts in effecting submarine operations.

Fig. 1.

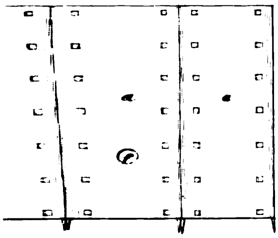


Fig. 3.

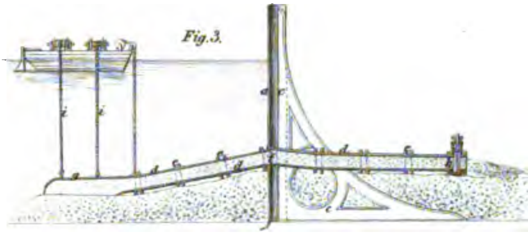


Fig. 2.

Fig. 5.

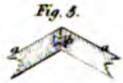


Fig. 4.

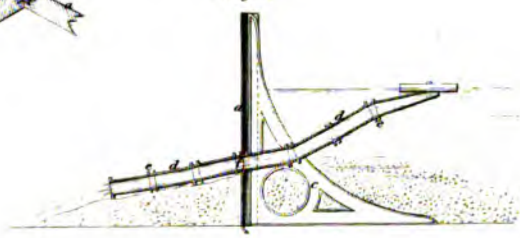


Fig. 9 / 10

Fig. 8.

Fig. 11.

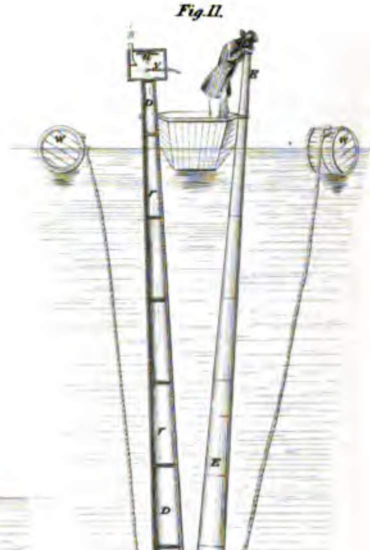
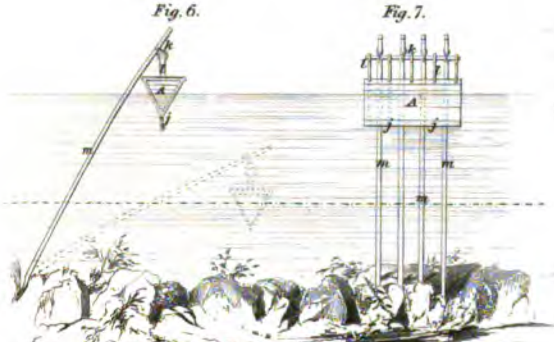
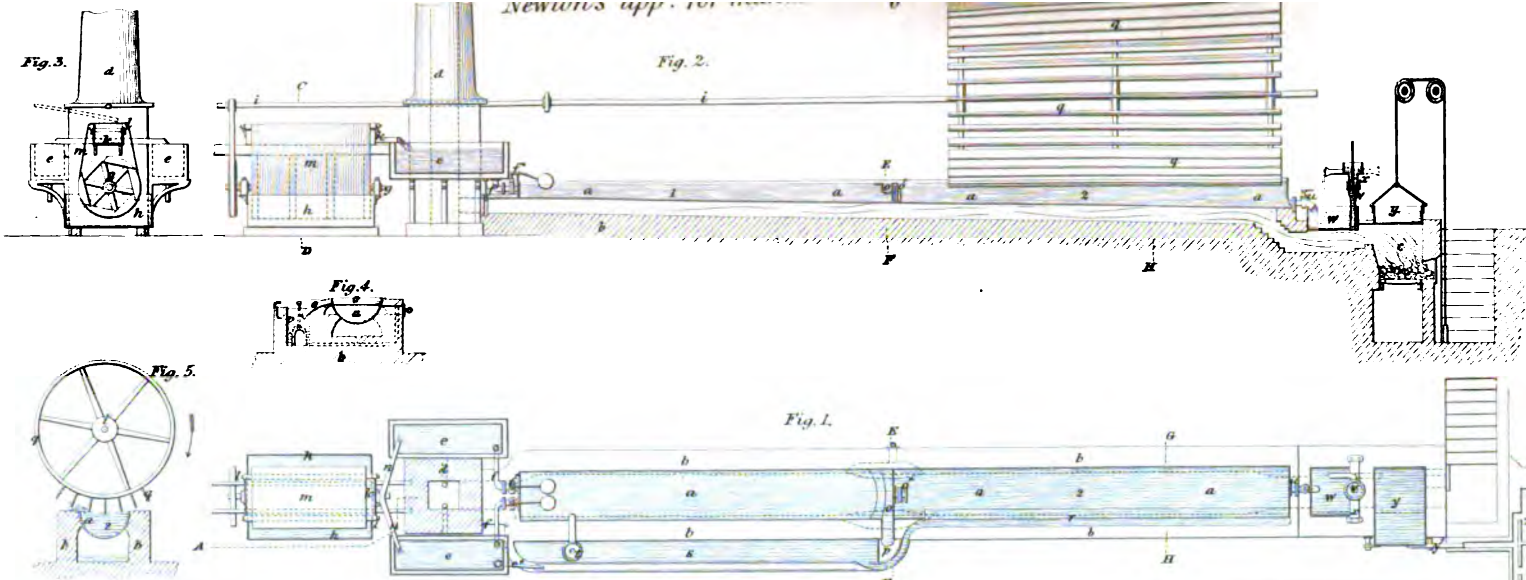


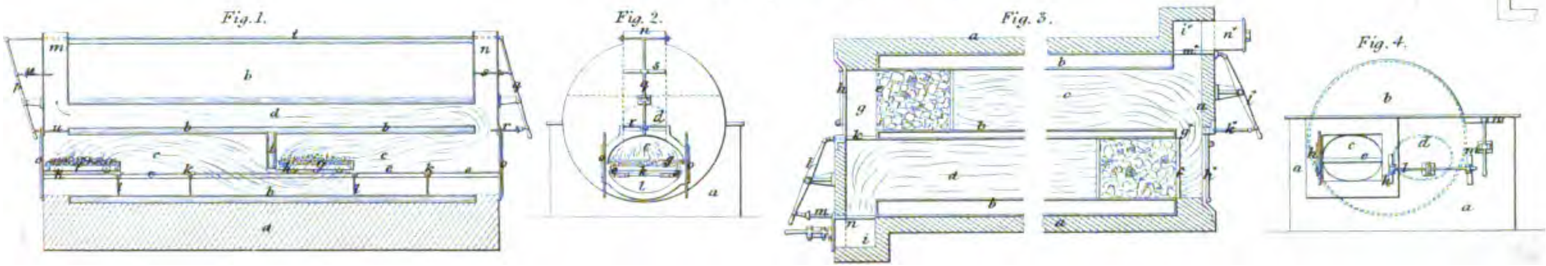
Fig. 6. Fig. 7.



W. Newton del. 1st March 1847 — Barr



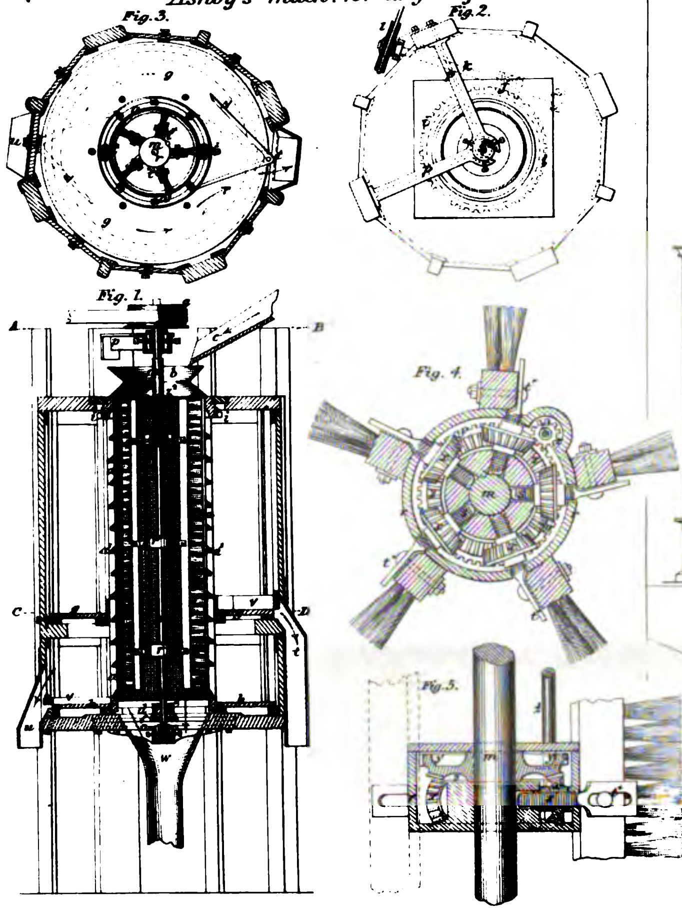
Lord's imp.ts in furnaces.



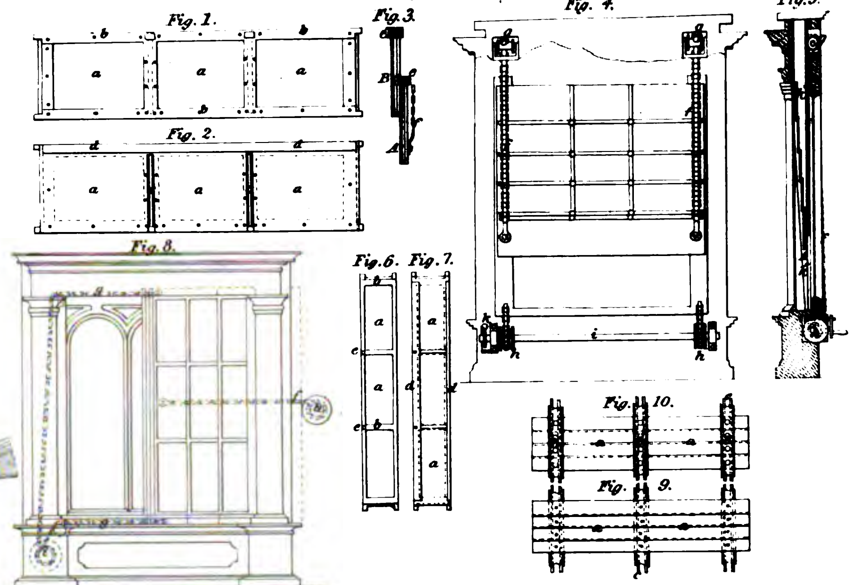
PL XXX.

CONJOINED SERIES.

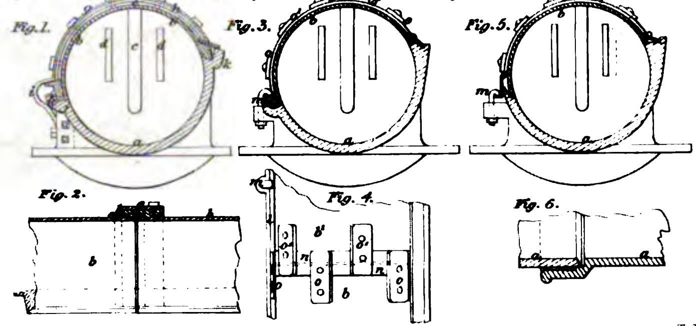
Ashby's mach.y for dressing flour.



Lewis' imp.d shutters.



Warcup's imp.ts in atmospheric railways.



Spenceley's imp.ts in ships & app.ts used therein.

Fig. 1.

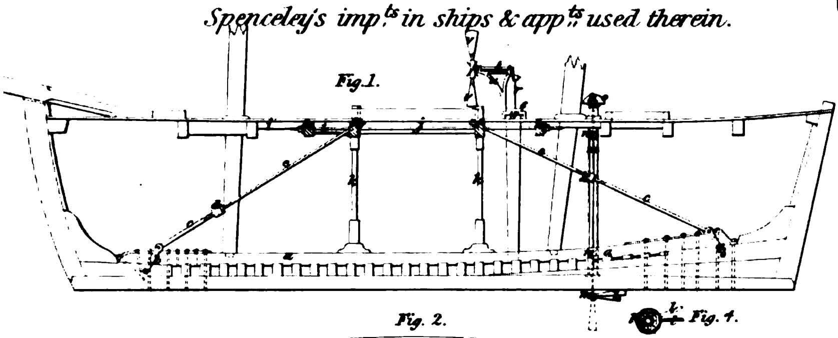


Fig. 4.

Fig. 2.

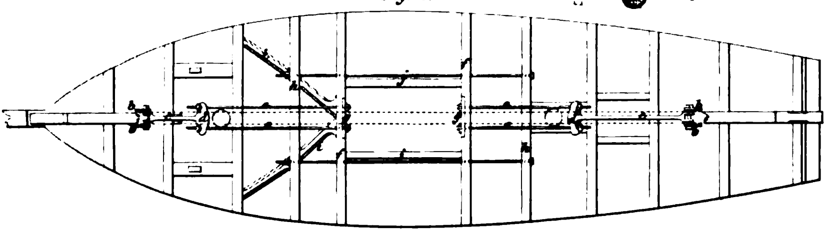


Fig. 3.

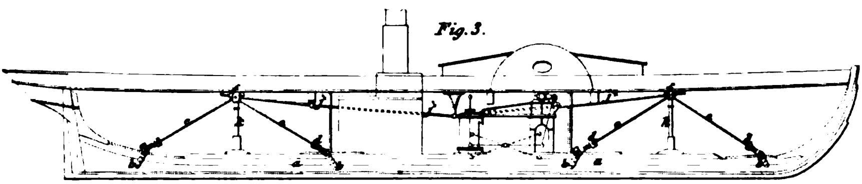


Fig. 5.

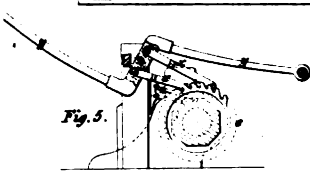


Fig. 7.

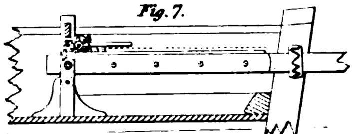
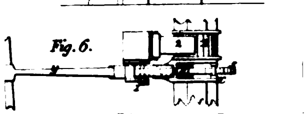


Fig. 6.



Jennings imp.d app.ts for evaporating liquids.

Fig. 1.

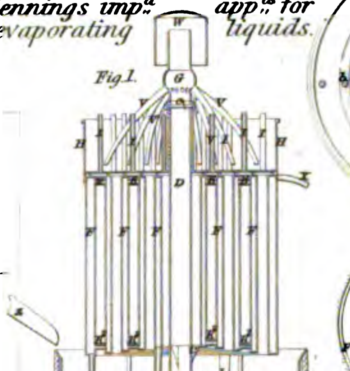


Fig. 2.

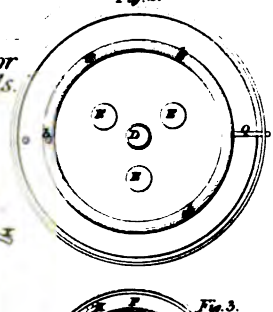


Fig. 3.

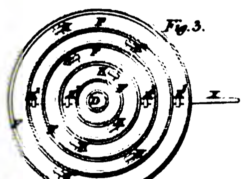
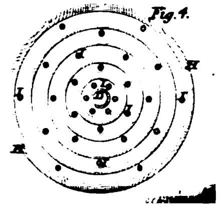


Fig. 4.



[R]ansome & Warren's tile machine.

Fig. 1.

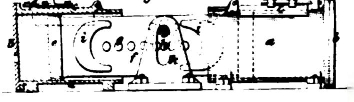


Fig. 2.

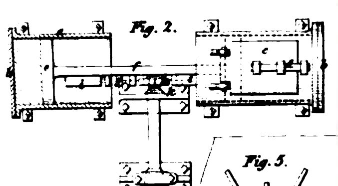
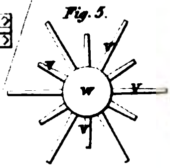
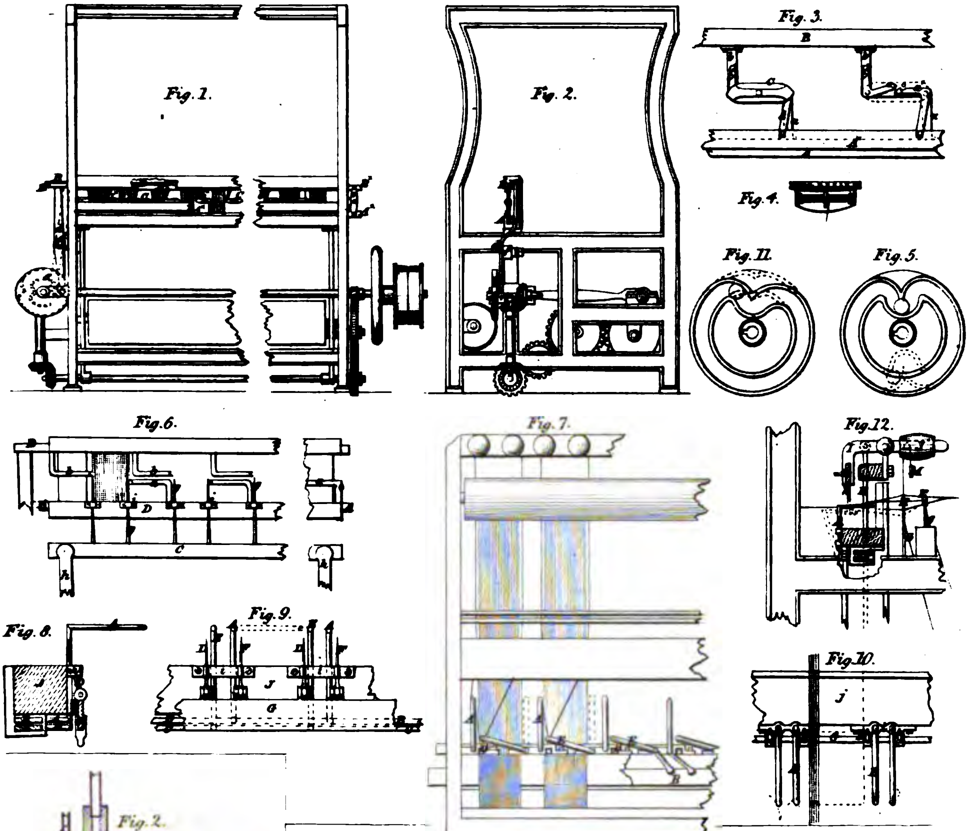


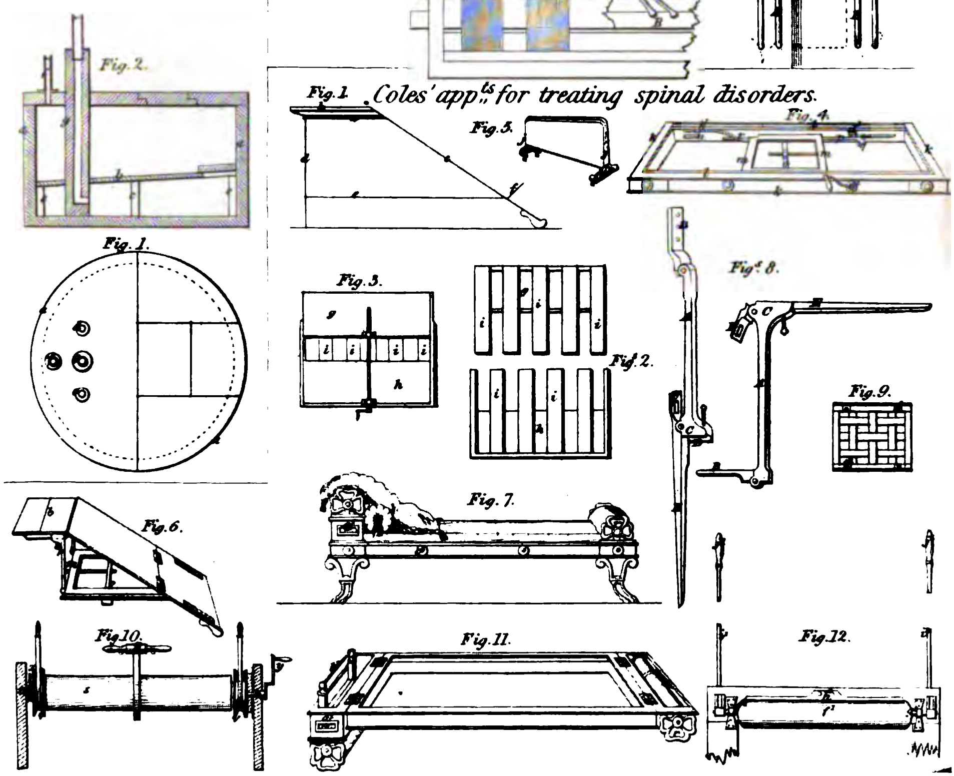
Fig. 5.



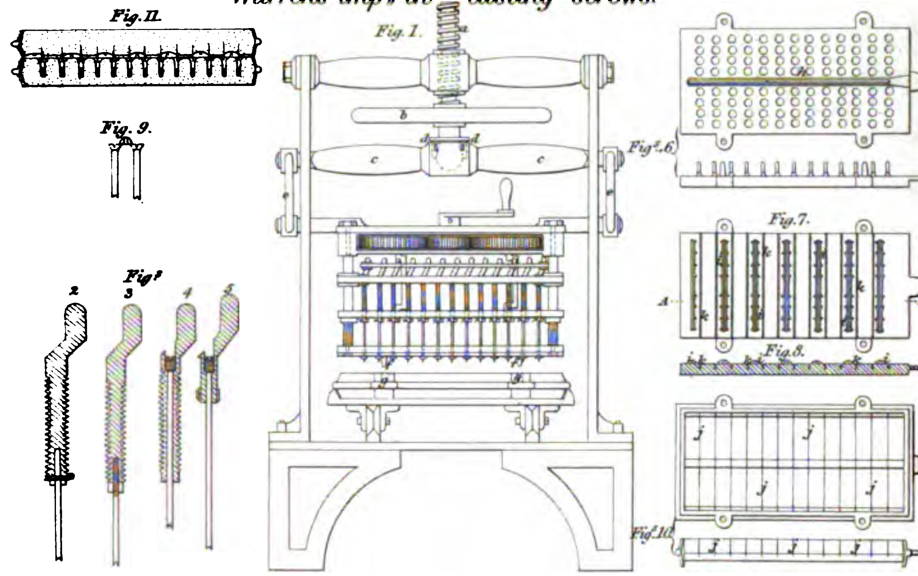
Unsworth's imp.^{ts} in ribbon looms.



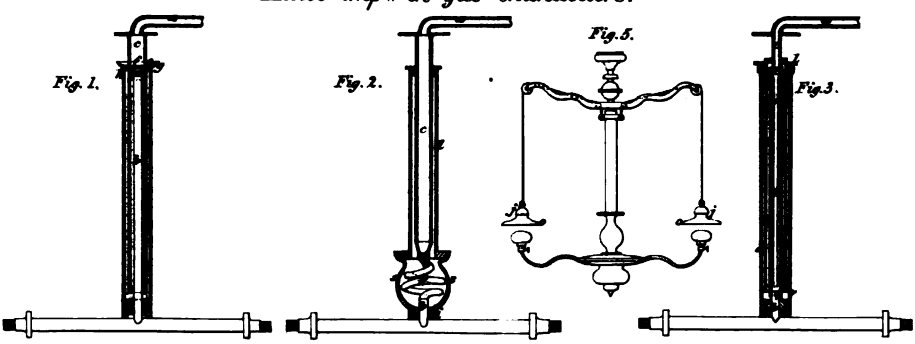
Coles' app.^{ts} for treating spinal disorders.

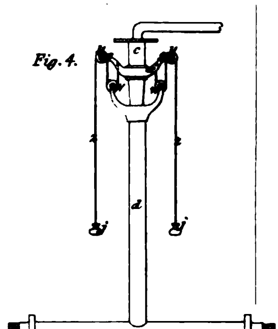


Warren's imp.ts in casting screws.

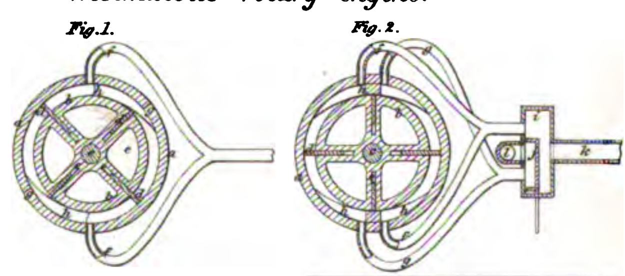


Hall's imp.ts in gas chandeliers.

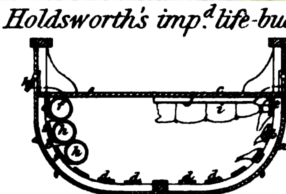




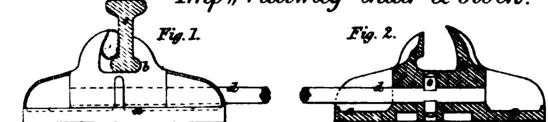
Westmacott's rotary engine.



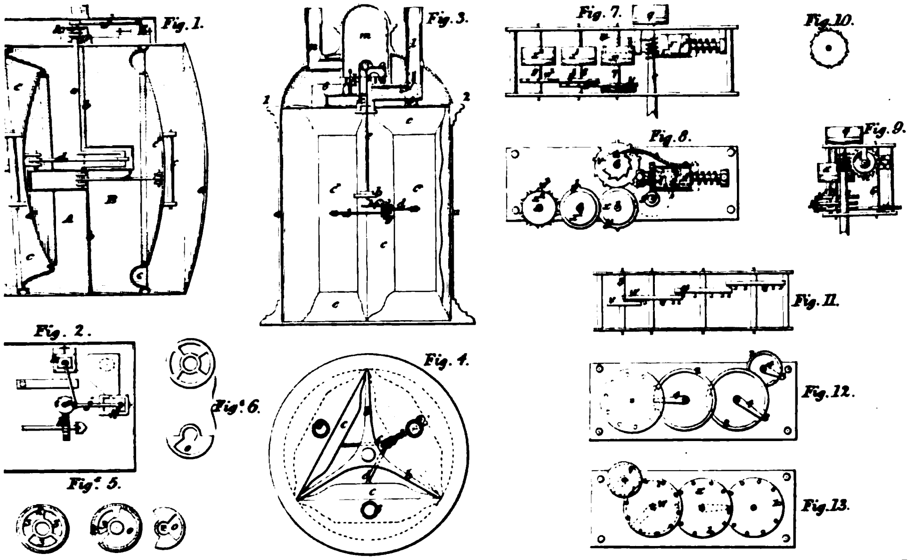
Holdsworth's imp.d life-buoys.



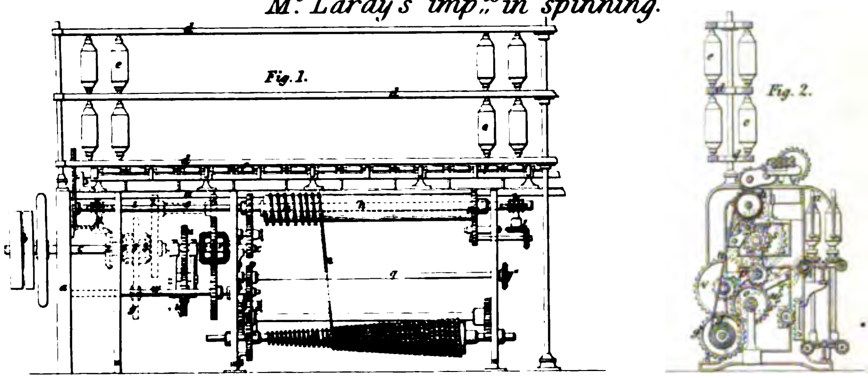
Imp.d railway chair & block.



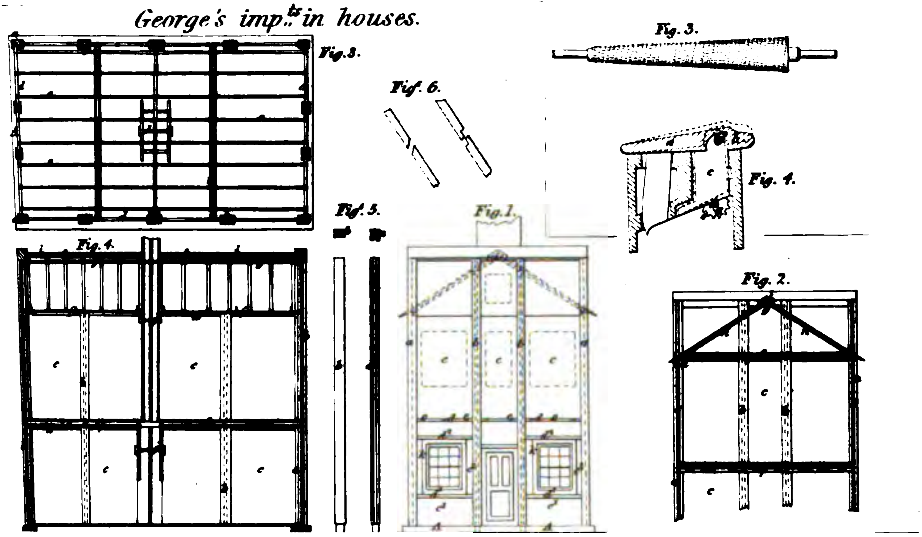
Smith's impts. in gas meters.



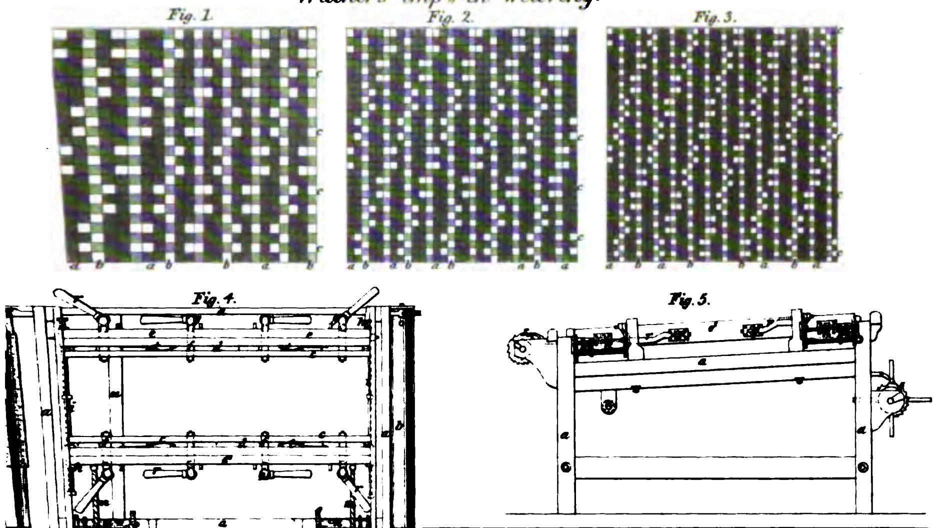
Mc. Lardy's impts. in spinning.



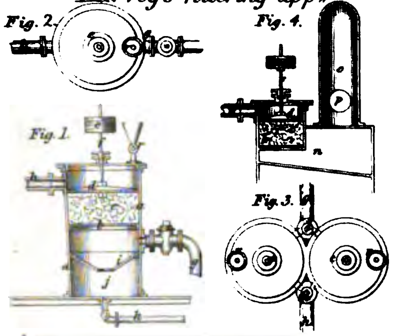
George's impts. in houses.



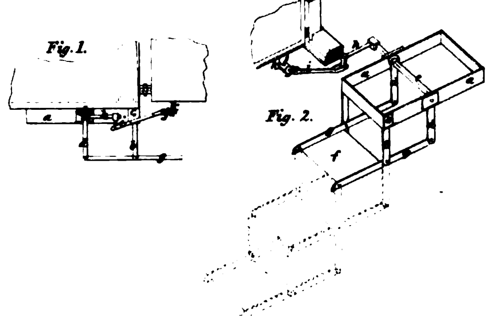
Walker's imp.ts in weaving.



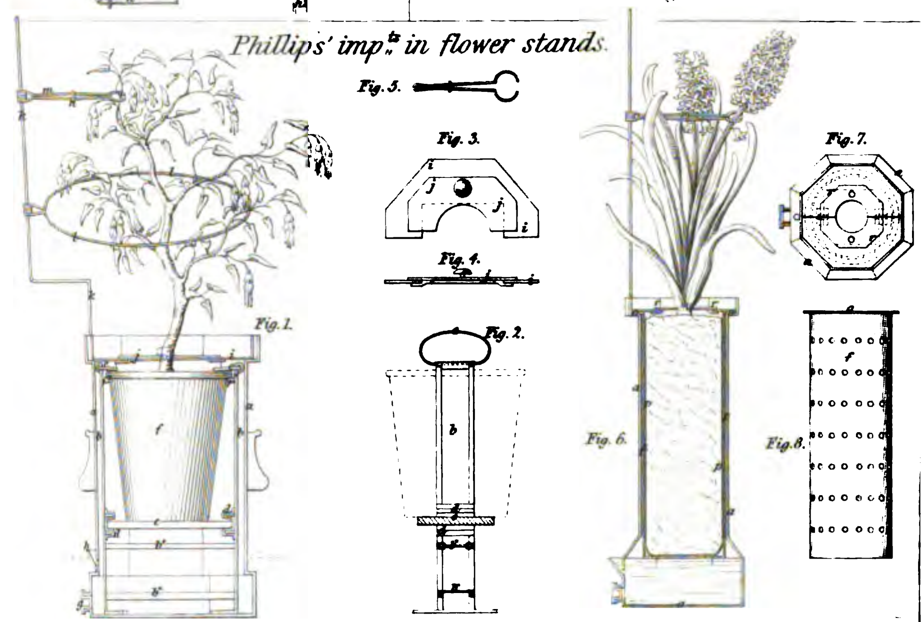
Harvey's filtering app.ts



Davies' imp.ts in carriage steps.



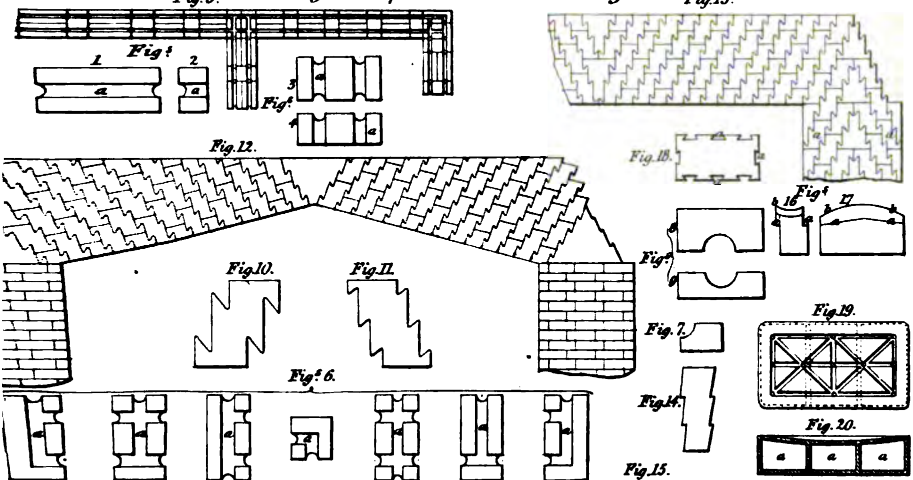
Phillips' imp.ts in flower stands.

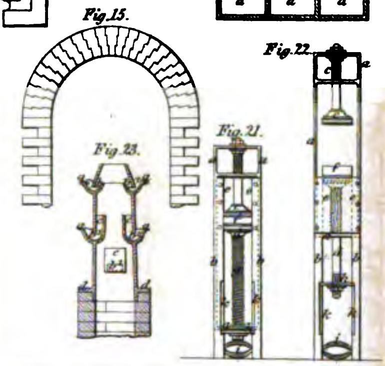


W. Newton del.

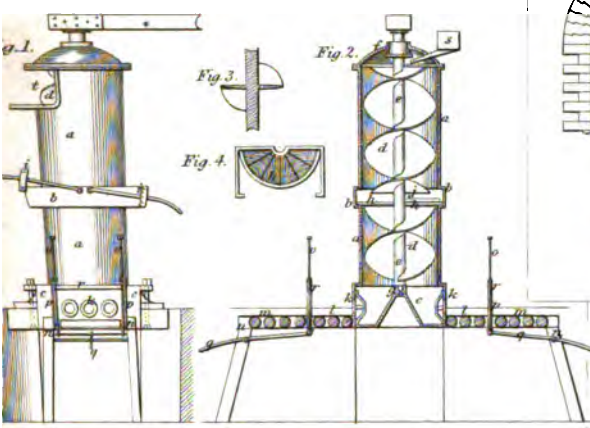
1st May 1847.

Percy's imp.ts in brick making.

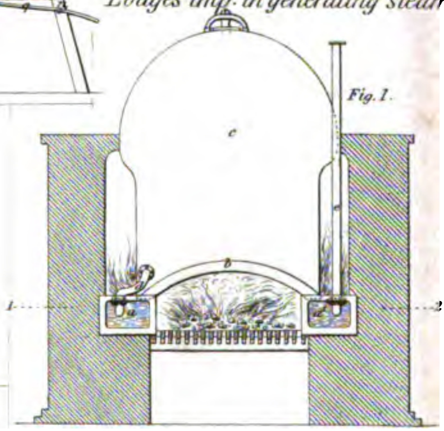


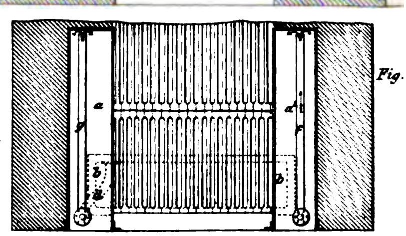


Franklin's brick & tile machine.

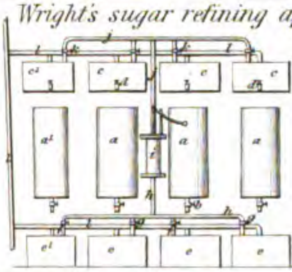


Lodges' imp.ts in generating steam

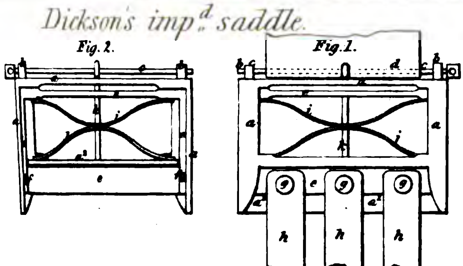




Wright's sugar refining app.ts



Dickson's imp.d saddle.



W. Newton del.

1st May 1847.

J.E.N.

Cotton's imp.d mach.y for knitting.

Fig. 1.

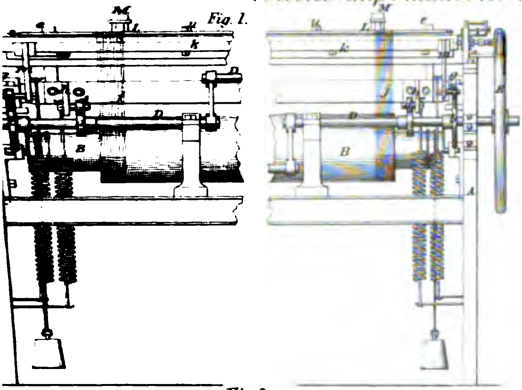


Fig. 2.

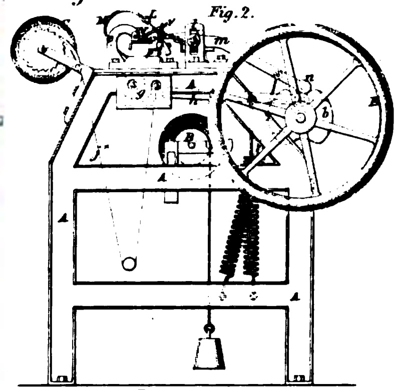


Fig. 3.

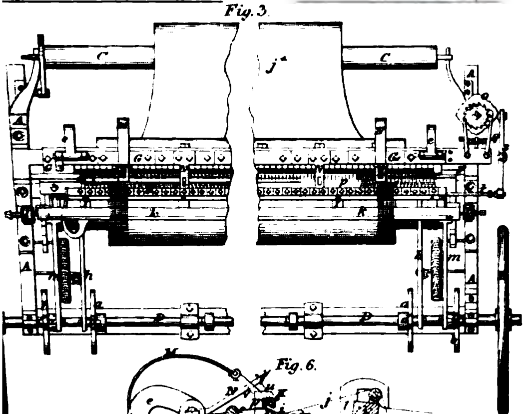


Fig. 5.

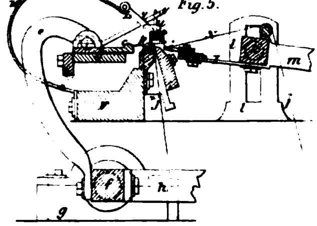


Fig. 4.

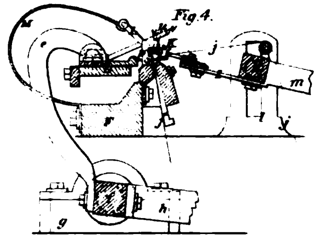


Fig. 6.

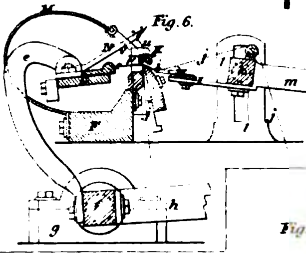


Fig. 1.

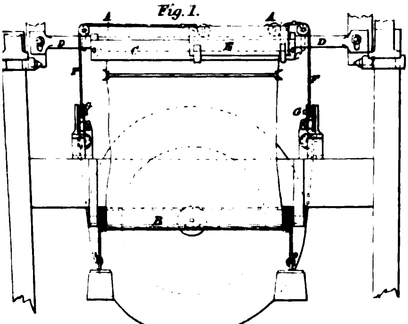


Fig. 2.

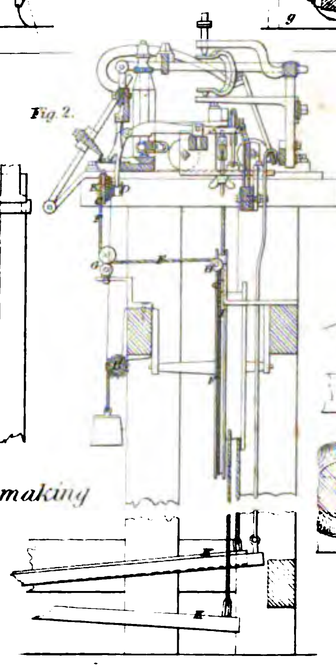


Fig 3

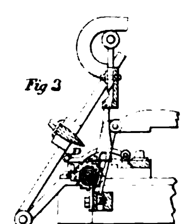
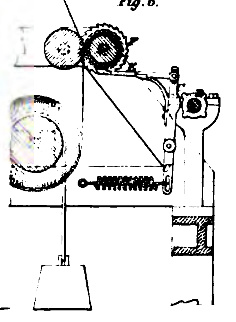


Fig. 6.



Thurman's imp.ts in making hosiery goods.

Fig. 9.

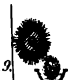


Fig. 5.

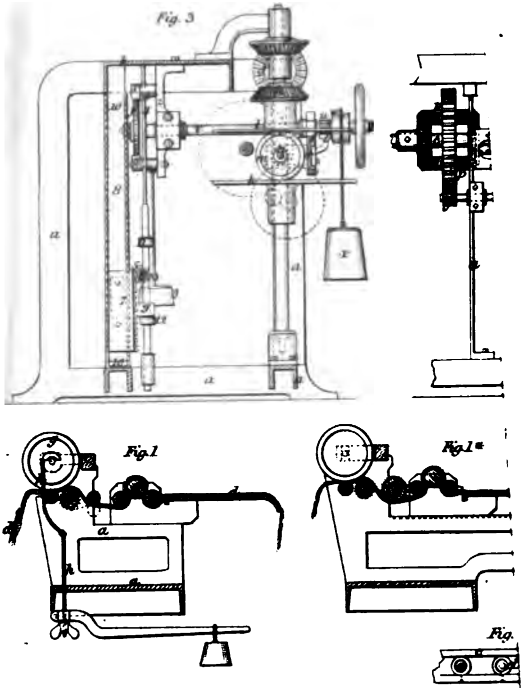
Fig. 4.

W. Newton. lil

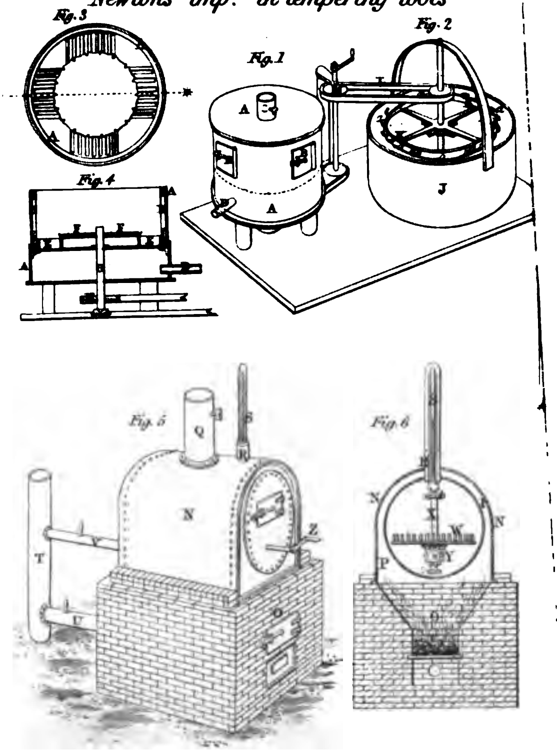
1st June 1847.

Sha…

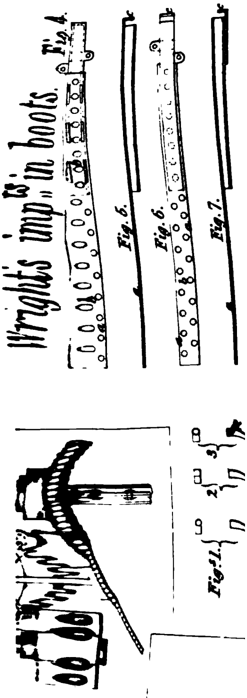
Fairbairn & Carmicha



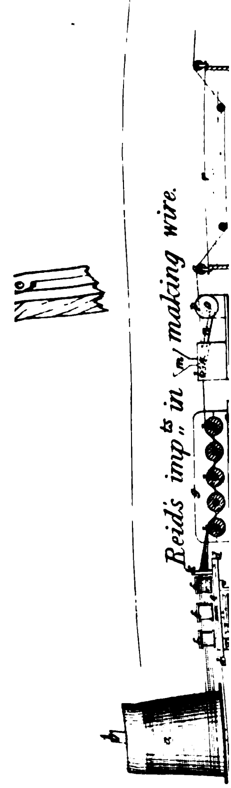
Newton's imp.ts in tempering tools

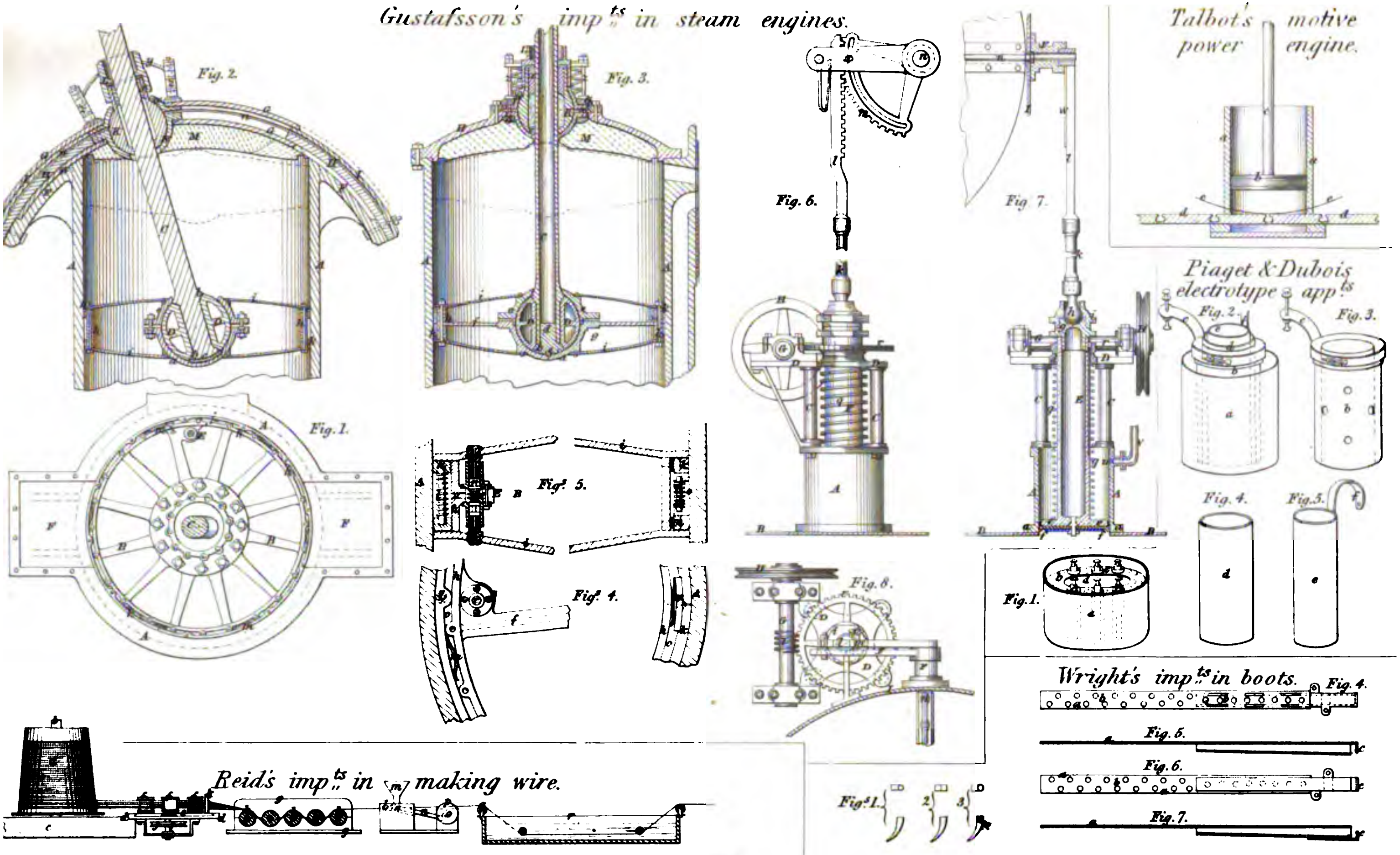


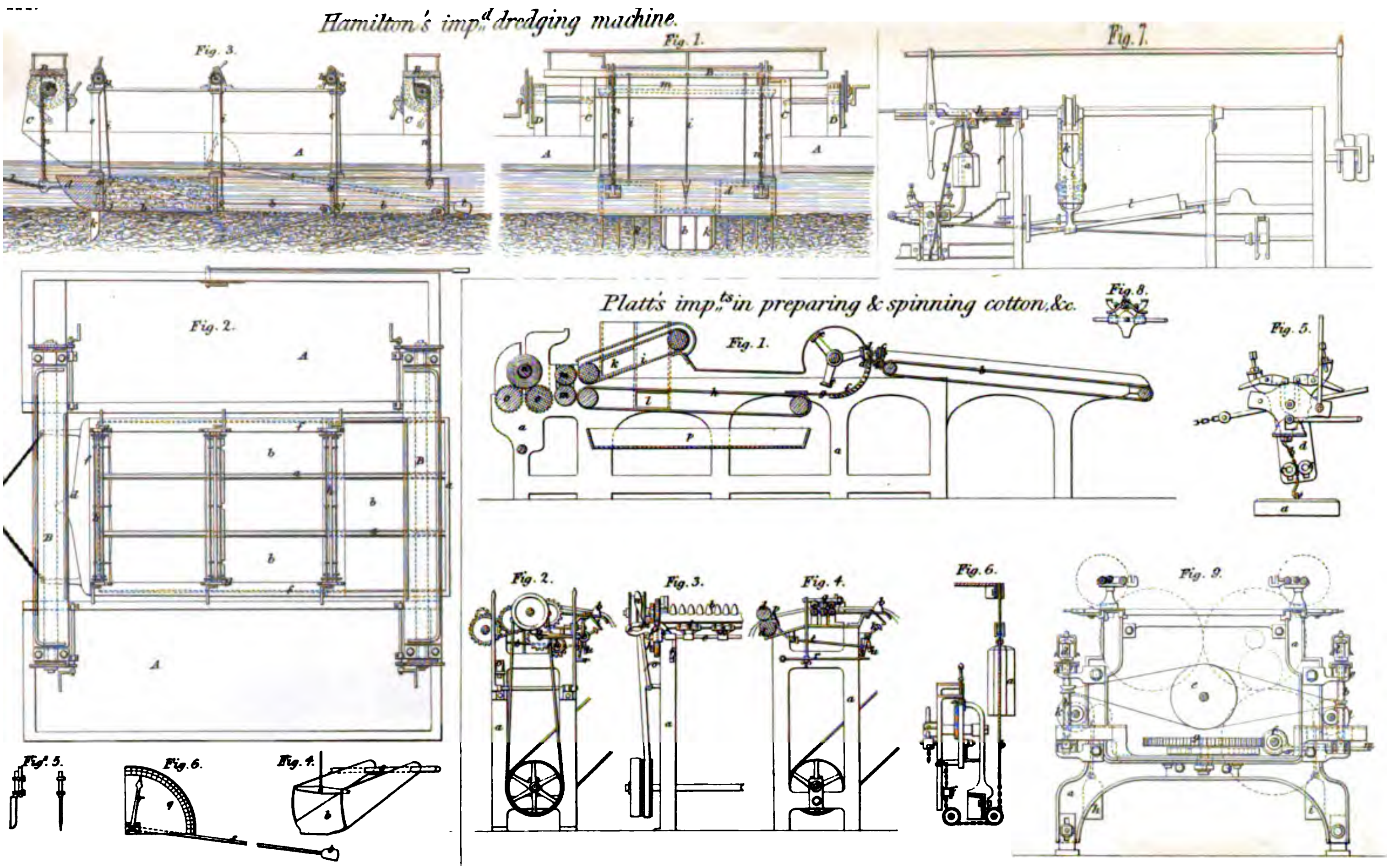
Wright's imp.ts in boots.



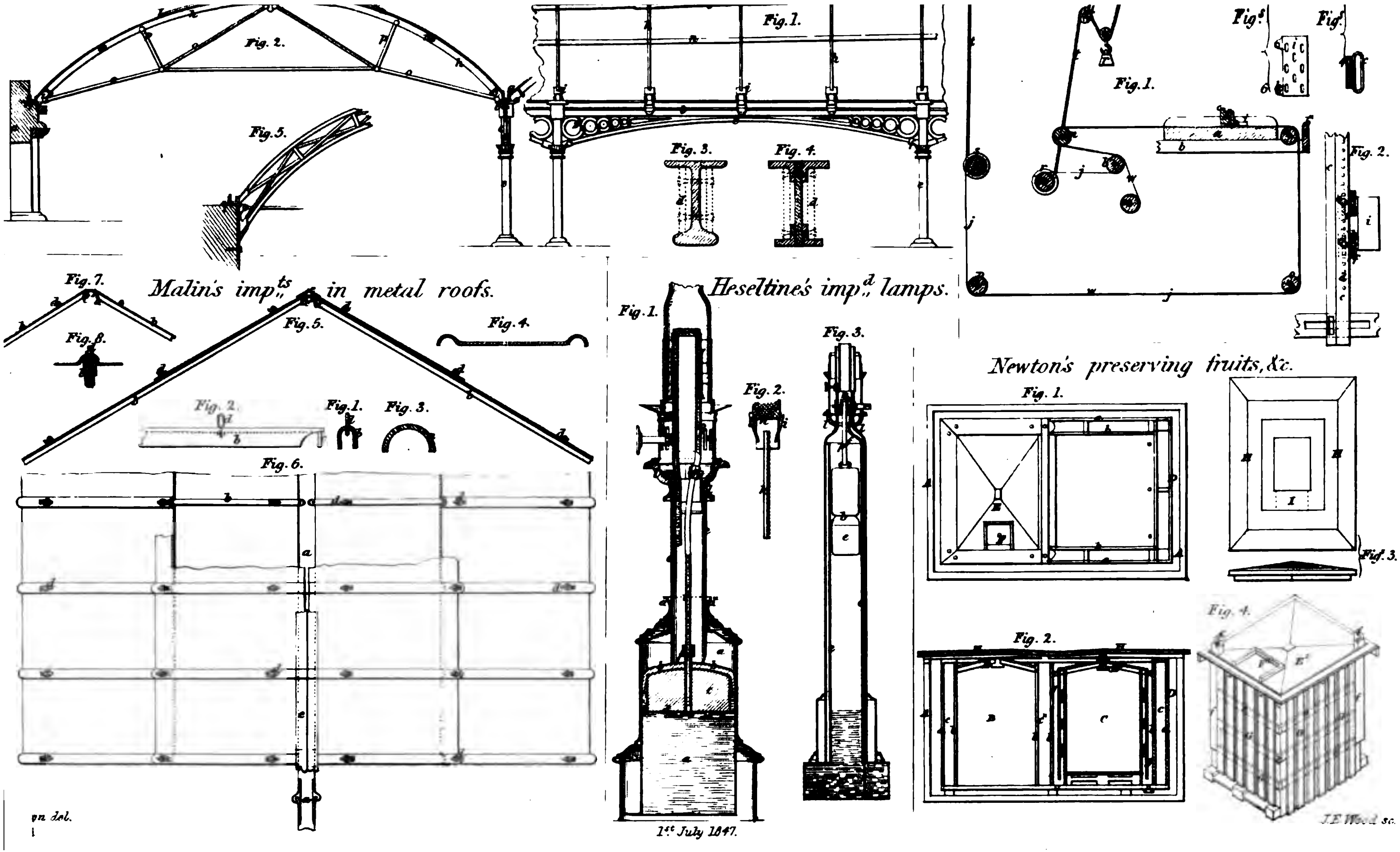
Reid's imp.ts in making wire.




Gustafsson's imp.ts in steam engines.
Fig. 1.
Fig. 2.
Fig. 3.
Fig.s 4.
Fig.s 5.
Fig. 6.
Fig. 7.
Fig. 8.
Talbot's motive power engine.
Piaget & Dubois electrotype app.ts
Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.
Fig. 5.
Wright's imp.ts in boots.
Fig. 4.
Fig. 5.
Fig. 6.
Fig. 7.
Reid's imp.ts in making wire.
Fig.s 1.
2
3



Hamilton's imp.d dredging machine.
Fig. 1.
Fig. 2.
Fig. 3.
Figs. 5.
Fig. 6.
Fig. 4.
Fig. 7.
Platt's imp.ts in preparing & spinning cotton, &c.
Fig. 1.
Fig. 2.
Fig. 3.
Fig. 4.
Fig. 5.
Fig. 6.
Fig. 8.
Fig. 9.



Malin's impts in metal roofs.
Heseltine's impd lamps.
Newton's preserving fruits, &c.
1st July 1847.
J.E. Wood sc.